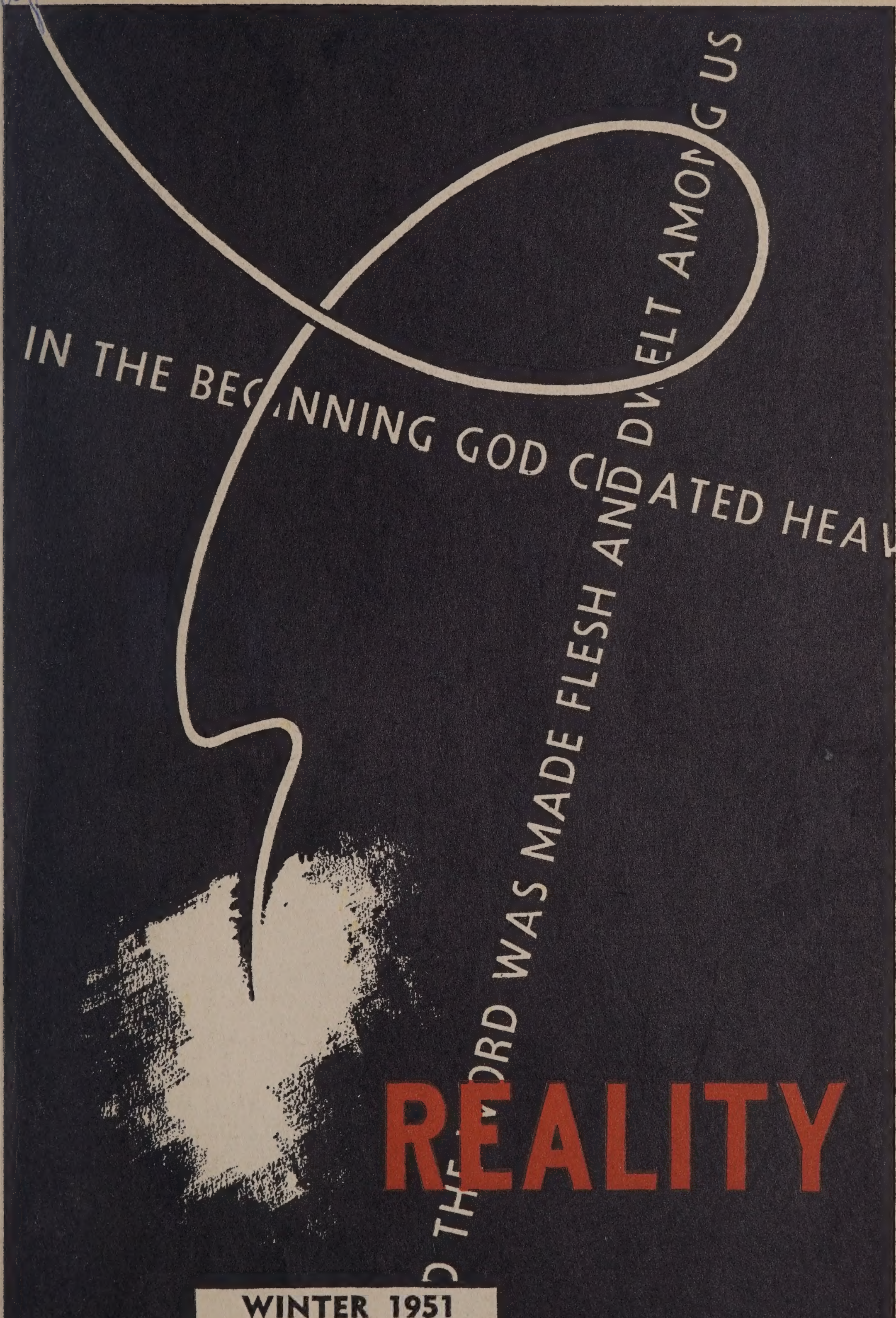
IN THE BEGINNING GOD CREATED HEAV
AND THE WORD WAS MADE FLESH AND DWELT AMONG US

REALITY

WINTER 1951

REALITY

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cum permissu superiorum

God, the Highest Truth, has created and guides human intellect, not that it may daily oppose new truths to rightly established ones but rather that having eliminated errors which may have crept in, it may build truth upon truth in the same order and structure that exist in reality, the source of truth.

Pius XII

Encyclical Humani Generis

DEDICATION

THIS ISSUE of REALITY is dedicated to His Paternity, the Most Reverend Father Emmanuel Suarez, Master General of the Order of Preachers, as a token of the devotion and gratitude of the students of the Province of St. Albert the Great.

This December twenty-second marks the anniversary of the Dominican Province of St. Albert; it is an even dozen years since its foundation. In itself this fact does not merit any special commemoration, but certain notable events have combined to make this occasion a most joyous one for the province, a joy in which we invite all our readers to share.

To enumerate all these events would make too long a list. We will mention the opening of two new mission fields halfway around the world from each other, one in Nigeria, the other in Japan; also the opening of the Albertus Magnus Lyceum for physical science in River Forest, Illinois, which will conduct summer courses for lay-scientists who are interested in the integration of science with Catholic philosophy. Worthy of more particular notice, however, is the establishment in the archdiocese of Dubuque of a new home for the Province's theological faculty, formerly located at River Forest. This new theology house has the office of educating not only Dominican students but also student seminarians of the metropolitan province of Iowa.

Amid all these changes, REALITY has not remained unaffected. It was transferred, with the theological faculty, from suburban Chicago to the outskirts of Dubuque and is now published from the Theological Studium of St. Rose in that city. This, the first issue to emanate from the new locale, marks an anniversary for REALITY — the first full year of its publication.

We wish to add yet another 'first' to the foregoing two and make this a first dedicatory issue to the Most Reverend Father who holds first place in our devotion as the successor of Our Holy Father, St. Dominic. His inspiration and foresight were an invaluable aid in establishing this student publication of St. Albert's Province. To His Paternity, the Most Reverend Father Emmanuel Suarez, we respectfully dedicate this issue of REALITY.

On the feast of the Immaculate Conception in this year of grace 1951 a tribute will be paid to the vision of our Most Reverend Master General. This day will witness the formal inauguration of the new theology house of St. Rose of Lima. With keen vision he foresaw this more than three years ago, when he inspired the building of a new novitiate large enough to house many novices. The consequent filling of this novitiate resulted in an overcrowding at the provincial motherhouse and the need for expansion. Out of this need was born St. Rose, at whose formal inauguration His Paternity may rightly take a fatherly pride.

REALITY itself feels indebted to him for the encouragement and impetus that he gave to its initial idea. On his visit to this land four years ago, he first mentioned the possibility of such a publication to the students. That idea turned into a 'reality' under the fostering guidance of our provincial, the Very Reverend Father E. L. Hughes. Please God, it will flourish in the future and ever remain close to that one Reality which is the source of all other reality.

We, the students of St. Albert's Province, feel deeply indebted to the Most Reverend Father Suarez for his fatherly interest in us and for his encouragement in our endeavors. This dedicatory issue is a pledge of our devotion to him and to the ideals of the Order of Preachers. May REALITY ever express the true doctrine of St. Thomas and of Holy Mother Church. May we follow in the footsteps of those great Preachers who have preceded us, remembering the words of Our Saviour, "He that shall do and shall teach; he shall be called great in the kingdom of heaven" (Matt. 5:19).

IN MEMORIAM

THE DOMINICAN PROVINCE of St. Albert the Great suffered a severe loss on November the twenty-third in the sudden and unexpected death of the Very Reverend Father Walter Farrell, O.P., S.T.M. A worthy son of St. Dominic, Father Farrell was a brilliant torch of truth shining in the darkness. He will continue to illuminate minds and enflame hearts by his writings, but his host of friends, within and without the Order, will miss the ardor of his friendship, the inspiration of his good works, and the wisdom of his counsel.

Father Farrell was born in Chicago in 1902, and entered the Dominican Novitiate in 1920. After following the philosophical and theological courses at the Dominican Houses of Studies in Springfield, Kentucky and Washington, D. C., he was ordained on the ninth of June, 1927. He took the degree of Doctor of Sacred Theology at Fribourg, Switzerland, in 1930. He was Professor of Sacred Theology in the Dominican Houses of Studies from 1931 until 1942, first at Somerset, Ohio and then in Washington, D. C. In 1939 he was appointed Regent of Studies for St. Joseph's Province, and in 1940 he received in Rome the highest degree the Order grants, the degree of Master of Sacred Theology. In the same year he became the first *Praeses* of the newly instituted Pontifical Faculty of Theology at the Dominican House of Studies in Washington, D. C. He held the posts of Regent of Studies and *Praeses* of the Theological Faculty until 1945.

During World War II, Father Farrell served as Chaplain in the Navy. After more than a year as Catholic Chaplain aboard the carrier U.S.S. Yorktown, he was appointed instructor at the Chaplains' School at the University of William and Mary, Williamsburg, Virginia.

Father Farrell is best known for his literary work. His first book, *The Essence of the Natural Law*, was published in 1930. In 1942 he received the Catholic Literary Award of the Gallery of Living Catholic Authors for his work, *A Companion to the Summa.* This four volume aid to the study of the *Summa Theologiae* of St. Thomas Aquinas won international recognition for its author, and has become for thousands of readers the bridge to the thought of St. Thomas Aquinas. Father Farrell's most recent work, *The Looking Glass*, was published in May 1951.

Father Farrell was the founder and for several years the editor of the Dominican periodical *The Thomist.* He collaborated in the founding and was associate editor of The Thomistic Quarterly of Spiritual Theology, *Cross and Crown.* He was a constant contributor to leading Catholic magazines and periodicals.

A deep respect for human nature and for the capacity of the human intellect to acquire wisdom through the systematic study of Sacred Theology made Father Farrell a staunch protagonist and defender of the position of Sacred Theology in the curriculum of Catholic educational institutions. He was an influential leader in the movement for teaching Sacred Theology in colleges, in Summer institutes for Sisters, and through lectures to the laity.

As Professor in the Dominican Houses of Studies, Father Farrell exercised by his teaching, example and counsel a deep influence, both theological and spiritual, on more than half of the eight hundred Dominican priests in the United States. His love for the ideals of the Order and his patent zeal for the established means made him a living model hewn to the likeness of the most illustrious sons of St. Dominic. As writer, lecturer and preacher, he gained for himself numberless debtors outside of the Order, who are beholden to him for his clear guidance to theological wisdom. His memory will remain dear, and the light which he shed will persist for many years to come.

FAITH AND THE ROSARY

> **VENERABLE BRETHREN** and beloved sons, while running your fingers over the beads of the Rosary, do not forget those who languish miserably in prison camps, jails and concentration camps.
>
> "There are among them, as you know, also Bishops dismissed from their sees solely for having heroically defended the sacred rights of God and the Church. There are sons, fathers and mothers wrested from their homes and compelled to lead unhappy lives far away in unknown lands and strange climates.[1]

Today the faith of Christians in Eastern Europe and the greater part of Asia is being purified by fire and the sword. Those who would cling to the faith of their fathers are able to do so only with great difficulty—in many cases the price of faith is martyrdom. In his recent encyclical letter *Ingruentium malorum* Pope Pius XII called on all Christians to seek the aid of the Mother of God through the Rosary for the alleviation of these and other evils which beset the world today.

The Virgin Mother of God has always been in a special way the guardian of the faith of Christians. Wherever the name of Mary is revered, there the faith is strong; and almost always the first attacks of those who would destroy the faith of Catholics are directed against the Mother of God. She is and always will be an implacable enemy of heresy and error. Thus we read in the office of the feast of the Rosary: "thou alone hast destroyed all heresies."[2] It is through the Rosary that God has seen fit to give to His Mother the victory over many heresies.

In the thirteenth century a particularly vicious heresy threatened the peace of southern Europe. The preachers sent to check the error were helpless until the Blessed Virgin appeared to Saint Dominic and gave him the Rosary. Thus armed, Dominic and his small band preached the gospel and implored the intercession of the Virgin. Finally, the Christian forces defeated the heretics at the battle of Muret; this was the beginning of the end of Albigensian heresy.

With the passing of the Albigensians the Rosary fell into disuse, as if it has served its purpose. However, about the middle of the fifteenth century in Brittany, Our Lady appeared to a Dominican Friar, Alan de la Roche, and bade him spread once more the devotion to her Rosary. The result was a great revival of this prayer. The time that this revival took place is worthy of note. In 1453 Constantinople fell to the Ottoman Turk, beginning a three hundred year siege of Christian Europe. The Church was badly in need of reform, and within seventy years misguided reformers were to lapse into a heresy which would split Christendom asunder. In such times, Christians would stand in grave need of the protection of the Mother of God; in the Rosary she gave them the instrument by which they could obtain it.

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[1] Pope Pius XII, Encyclical Letter *Ingruentium malorum,* September 15, 1951. (Trans. NC release in the Brooklyn Tablet, September 21, 1951)

[2] ". . . cunctas haereses sola interemisti." (*Breviarium,* S.O.P. [Romae, 1947] pars ii, pag. 992)

In 1571 the Ottoman Turk had control of the Mediterranean; the fleet of Selim the Drunkard threatened the heart of Christian civilization. The Pope, Saint Pius V, called for a crusade of prayer, an appeal to the Mother of God through the Rosary. The two fleets met at the straits of Lepanto, at the western end of the Gulf of Corinth, and against heavy odds the Christian fleet emerged victorious. Although stopped on the sea, the threat of Islam to Christendom was by no means ended; for over 150 years the armies of the Turks hammered at Central Europe. In 1683 they were stopped at the gates of Vienna, and in the early eighteenth century the Christian victories at Belgrade and at Corfu ended finally the threat of this power to Christian Europe. These victories were attributed by Pope Clement XI to the intercession of the Queen of the Rosary; he cited them as reasons for extending the feast of the Most Holy Rosary to the Universal Church.

But one might well say: How do these instances show that the Rosary is an effective instrument to keep the faith alive and strong among Christians? These victories were all achieved in the end by force of arms—even the victory over the Albigenses in Saint Dominic's time. One might be led to state that as far as the faith itself was concerned the Rosary was a failure, simply because a resort to arms was needed. This could leave as purely negative the part played by the Rosary in the preservation of the faith: the gaining of God's help against the enemies of the faith. That is indeed a good thing, and an important one; it gives to Christians the freedom to practice their religion.

But is it necessary to limit the function of the Rosary to this negative role? Is it not possible to show that the Rosary is a positive instrument which strengthens the faith of Christians and leads them to a life of virtue? Further still, does not this strengthened faith render them worthy of the opportunity to practice their religion in peace—a peace obtained only at the price of military victories over these enemies of the faith? There are, of course, many things which cannot be accurately determined by history, and although the Popes and Christian Tradition do not hesitate to attribute the military victories to the intercession of Mary obtained through the Rosary, the positive element, that of strengthening the faith and virtue of the people of Christ, is more difficult to ascertain. However, the fact that the Blessed Virgin has never ceased to recommend the Rosary as a means of obtaining the divine aid against heresy makes it worth while to consider this positive role of the Rosary with respect to the faith.

First, we might consider the institution of the Rosary. The Albigensian heresy, against which the Rosary was first employed, was not a heresy which balked at one or two articles of faith; rather it was almost a compendium of all the errors which had opposed the Christian religion from the beginning. It was one of the many varieties of the Manichean heresy, which according to Saint Thomas contained more errors than were found even among the pagans.[3] Hence to combat this heresy it was necessary to propose the fundamentals of Christian doctrine to a people who were ignorant of Christian teaching, except for the *Our Father*, the *Hail Mary*, and a few other prayers. The Rosary provides an excellent means for just such a task, combining as it does the most basic and beautiful of prayers with meditation on the mysteries of our holy faith.[4]

The vocal prayers themselves contain the basis for the mysteries of the Rosary. When we pray the *Our Father* we address the divine Father, ever mindful of the divine Son, the Incarnate Word of God who taught us this prayer. The circumstances in which the *Hail Mary* was first pronounced bring to our attention the fact of the Incarnation of the Son of God and reveal to us the third person of the Most Holy Trinity: "The Holy Ghost shall come upon thee, and the power of the most High shall overshadow thee. And therefore also the Holy which shall be born of thee shall be called the Son of God."[5] Thus we can discover through the vocal prayers of the Rosary the mysteries of the Trinity and the Incarnation: supernatural mysteries which must be believed by all for salvation.[6] In addition, the doxology which is said at the end of each decade contains an explicit expression of the mystery of the Trinity.

In the mysteries which are proposed for meditation during the recital of the prayers we find a further development of these most basic truths. The Joyful mysteries are concerned with the Incarnation, and not only propose to us the mysteries to be believed, but also the example of the virtuous lives of Jesus Christ and His Blessed Mother. We see, for example, the humility of Mary as she is told that she is to be the mother of the Saviour; the poverty of the Holy Family; their obedience to the will of God; the obedience of the Child Jesus to Mary and Joseph. But the Incarnation of the Son of God is ordered to the Redemption of man from sin; hence in the sorrowful mysteries we consider the Redemption. Here we are faced with the terrible price of our sins: the suffering and death of Christ. Here we can look upon the redemption of man on the tree of the Cross and find new cause for hope and love, "because yet when we were sinners, according to the time, Christ died for us; much more therefore, being now justified by his blood, shall we be saved from wrath through him."[7] In the Glorious mysteries we consider the fruits of the sacrifice of Christ: His Resurrection and Ascension into heaven; the sending of the Spirit of Truth to keep from error the Church which He founded and to sanctify His members; the glory of God's grace in the Mother of God.

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[3] *Summa Theologiae,* II-II, q. 10, a. 6.

[4] The Rosary did not have the definitive form in Saint Dominic's time that it has today, but was essentially the same: meditation on an ordered series of basic revealed truths as the vocal prayers were recited.

[5] Luke 1:35.

[6] Cf. *Summa Theol.* II-II, q. 2, aa. 7-8.

[7] Romans 5:8-9.

Thus considering the original purpose of the Rosary, the vocal prayers, and the mysteries, we can see that the Rosary is indeed an apt instrument to foster the faith, for in praying the Rosary one's attention is focused upon the most basic and necessary truths of the faith: the Trinity, the Incarnation, the punishment for sin and the reward for goodness. Since the act of faith, according to Saint Augustine, is "to think with assent"[8] the saying of the Rosary implies a continual act of faith. Regarding this the Holy Father says:

> "Adding to the vocal prayers the meditation on the Sacred mysteries, there emerges another advantage, that all, even the most simple and least educated have in this a prompt and easy way to feed and keep their own faith."[9]

Today we are faced with a new menace to our faith. Atheistic Communism, like the heresy of the Albigenses, is a force which is completely and unequivocally anti-Christian. Like the Christians in other times of crisis, we are aware of the grave danger which faces us. The free nations of the world are even now preparing to resist further military aggression on the part of the Communist nations. But we must admit that many in the West are helpless in the struggle against Communism, which involves not only a possible armed conflict but, more basically, a war of ideas. A materialistic philosophy is of no avail in this struggle, for in Communism materialism finds its ultimate development; with an almost diabolic penetration the leaders of Communism have ruthlessly carried the principles of a materialistic philosophy to their ultimate conclusions. Like Satan and his cohort of rebellious angels they have set themselves up as self-sufficient — they would attain happiness without the help of God, and they prefer to become enemies of God rather than submit to the divine plan.[10] The only thing which can successfully oppose this is the Gospel of Jesus Christ. Any philosophy which seeks human happiness in material things *or in merely human goods,* any system which has no place for God, cannot logically oppose Communism; their fundamental principles are too much alike. Only in the realization of the supernatural destiny of man, in submission to Christ, in acceptance of the divine revelation perfected by Christ and jealously guarded through the ages by the Church will man be able to free himself and reach his true destiny. This cannot be done with a mere acceptance of the truths of faith; our faith must be living, a faith which, under the influence of a burning charity, will carry the principles of the Gospel into action.

It is for this that the Holy Father has asked the Christians of the world to seek the help of the Mother of God through the Rosary: that we may be freed from all of the evils which afflict our times. He does not limit these evils to the power of Communism and the lack of fraternal unity among nations. These indeed hold a primary place in his intentions; but he also asks that we pray for peace and a revival of Christian ideals among individuals and in family life. In his own words:

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[8] "Quamquam et ipsum credere nihil aliud est, quam cum assensione cogitare." (*De Praedestinatione Sanctorum,* cap. 2 [PL 44, 963]). Cf. also Saint Thomas, *Summa Theol.,* II-II, q. 2, a. 1.

[9] Encyclical *Ingruentium malorum.*

[10] The comparison between the sin of the angels and those philosophies which *reject* God to place human happiness in merely human good is striking. Cf. *Summa Theol.,* I, q. 63, a. 3.

> The very powerful Mother of God, moved by the prayers of so many of her sons, should obtain from her own Child—we all beseech her—that those who have been miserably led astray from the path of truth and virtue, should, renewed in their souls, find it again.
>
> Grant us that finally hatred and rivalry, the sources of discord and every sort of mishap should calm down, and that a true, just and genuine peace should shine again upon individuals, families, peoples and nations. Grant that finally, after the rights of the Church are secured as is just, the beneficient influence deriving from her and penetrating without obstacle the hearts of men, social classes and the arteries of public life, may join people among themselves in brotherhood and lead them to prosperity which regulates, defends and coordinates the rights of all and establishes itself ever more for mutual and common collaboration.[11]

Jordan Bishop, O.P.

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[11] Encyclical, *Ingruentium malorum.*

NATURAL HISTORY

MAN'S INTEREST in the world about him goes back to his very first days upon this earth, back to the Garden of Eden, for in the Book of Genesis is found the following narrative:

> And the Lord God, having formed out of the ground all the beasts of the earth, and all the fowls of the air, brought them to Adam to see what he would call them: for whatsoever Adam called any living thing the same is its name.
>
> And Adam called all the beasts by their name, and all the fowls of the air, and all the cattle of the field.[1]

Throughout history this interest has continued. The earliest school of Greek philosophy, the Ionian school, was interested primarily in the material cause of natural things. Pliny's *Natural History* testifies to the Roman interest in nature. Although some call the Middle Ages sterile with regard to interest in natural history, the numerous plants and animals carefully sculptured in the stone of the great cathedrals prove the opposite to be true. In more modern times Cuvier, Buffon, and Fabre continue this traditional interest.

The purpose of this paper is to consider only two of the great natural historians, Aristotle and Saint Albert the Great. Aristotle is recognized among modern biologists for his work in laying the foundations for biology, as the following passage from a standard college biology text shows:

> Aristotle was the most noted Greek scientist. His many written works were regarded as authoritative for more than a thousand years after his time. He made extensive investigations of plant and animal life and was one of the first to classify organisms and to systematize knowledge concerning them; hence he may be regarded as the first biologist.[2]

Saint Albert is not as well recognized, because he suffers from the fable that the Middle Ages were a period when interest in natural history was not in vogue.[3] Another factor contributing to the lack of knowledge about him is the absence of English translations of his works, or even of good, generally-available Latin texts.

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[1] *Genesis,* 2:19-20.

[2] Leslie A. Kennoyer and Henry M. Goddard, *General Biology* (New York: Harper & Brothers, 1945), p. 10.

[3] Cf. William Beebe, *The Book of Naturalists* (New York: Alfred A. Knopf, 1945), p. 7: "With the rise of Christendom creative observation and learning sank to an all-time low level, and mental activities during the middle ages were confined chiefly to religious, metaphysical, and abstract disquisitions. If an argument arose as to the number of teeth possessed by a horse, there would ensue long and bitter oral and written debates, without its occurring to anyone to look into the mouth of the animal."

A study of the natural history of Aristotle and Albertus Magnus might take one of several forms. The descriptions of plants and animals as given by them might be compared with contemporary knowledge of the same organisms. A number of such studies have been made: Wimmer[4] and Killermann[5] have studied the plants and birds recorded by Saint Albert, and D. W. Thompson[6] has done similar work on Aristotle's *Historia Animalium.*

The results of these studies indicate that both Aristotle and Saint Albert may be revered as truly great naturalists, but only a few examples of their findings can be given. Thompson writes of Aristotle:

> But there is one remarkable structure that he knew, centuries before it was rediscovered almost in our own time. In certain male cuttlefishes, in the breeding season, one of the arms develops in a curious fashion into a long coiled whip-lash, and in the act of breeding may be transferred to the mantle-cavity of the female. Cuvier himself knew nothing of the nature or the function of this separated arm, and indeed, if I am not mistaken, it was he who mistook it for a parasitic worm. But Aristotle tells of its use and its temporary development, and of its structure in detail, and his description tallies closely with the accounts of the most recent writers.[7]

Speaking of Saint Albert's studies of birds, Sebastian Killermann says:

> If we now, at the close, consider the whole work, we must notice that Albert certainly has great importance for the science of birds. The history of ornithology may not pass by without paying attention to him who has introduced the whole natural science of ancient times to the modern era.[8]

Purpose

However, the aim of this paper is not to study the natural history of Aristotle and Saint Albert merely as a collection of facts about plants and animals, but rather to show its importance to the philosophy of nature of the Aristotelian-Thomistic school of philosophy. The thesis which this paper will defend is that natural history is an essential part of Aristotelian-Thomistic natural philosophy.

Although more than fifteen centuries separate Aristotle and Saint Albert, there is good reason for uniting them in a study of this sort. Saint Albert's writings on natural history take the form of a commentary on the works of Aristotle, where they are extant in this field. For example, Saint Albert's natural history of animals, the *De Animalibus,* is a commentary on the *Historia Animalium, De Partibus Animalium,* and *De Generatione Animalium* of Aristotle. These three works came to Saint Albert in the form of a single work which included the nine books of the *Historia Animalium,* a tenth book of the same work which is regarded as spurious, the four books of the *De Partibus Animalium,* and the five books of the *De Generatione Animalium.*[9] However, Saint Albert is not to be regarded as a mere slave of Aristotle. Considered quantitatively, the bulk of his work is several times that of Aristotle, and after he has commented on the nineteen books of Aristotle, Saint Albert adds seven more of his own. Five of these books are devoted to alphabetical catalogues of all the animals that he knows. In his treatment of natural history he is not afraid to correct the ancient writers from his own observations, as the following example shows:

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[4] J. Wimmer, *Deutsches Pflanzenleben nach Albertus Magnus* (Halle: Verlag der Buchhandlung des Waisenhauses, 1908).

[5] Sebastian Killermann, *Die Vogelkunde des Albertus Magnus* (Regensburg: G. J. Manz, 1910).

[6] D'Arcy Wentworth Thompson, *On Aristotle as a Biologist* (Oxford: Clarendon Press, 1913).

[7] *Ibid.,* p. 9.

[8] Killermann, *op. cit.,* p. 95.

> We, however, divide marine animals into ten genera; nevertheless, the ancients mentioned only eight genera. When I sailed the seas for the purpose of experimenting and went to the islands and the shores, with my hands I collected ten or eleven genera.[10]

The second reason for uniting Aristotle and Saint Albert in this paper is their importance in the development of natural philosophy. Aristotle's writing formed the basis for Saint Thomas' great synthesis of natural philosophy; Saint Albert made the complete natural philosophy and natural history of Aristotle available to the thirteenth century, taught Saint Thomas himself, and brought natural history to the greatest perfection that it has ever attained in Aristotelian-Thomistic philosophy. It is evident, therefore, that a consideration of natural history as these two philosophers developed it represents the Aristotelian-Thomistic tradition most adequately.

It must be noted here that only the natural history of animals will be formally considered in this paper. This will make for greater unity. Moreover, Aristotle has left no treatise on the natural history of plants; Albert's *De vegetabilibus et plantis* is based upon a pseudo-Aristotelian work.

Method

The method of this paper will be to consider the meaning of the terms "natural history" and "natural philosophy." When some idea of their significance has been obtained, an attempt will be made to show the influence of Aristotle's studies in natural history on the development of his natural philosophy. Then the natural history of Aristotle and Saint Albert will be considered. Finally, certain objections to the thesis of this paper will be answered.

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[9] Cf. Amable Jourdain, *Recherches Critiques sur l'Age et l'Origine des Traductions Latines d'Aristote* (New edition, Paris: Joubert, 1843), p. 327: "La première de toutes les sources où Albert a puisé est sans contredit l'Histoire des Animaux d'Aristote, non pas d'après une version faite sur le grec, mais d'après la version de Michel Scot, qui avait pour original un texte arabe, et se compose de dix-neuf livres. Cette division n'a rien qui doive étonner; chez les Arabes, l'Histoire des Animaux embrasse: 1°. Les neuf livres de nos éditions; 2°. Le dixième, dont l'authenticité contestée dans ces derniers siècles n'était alors l'objet d'aucun doute; 3°. Les quatre livres des Parties des Animaux; 4°. Le cinq livres de la génération."

[10] "Marina autem dividimus in decem genera: sed tamen antiqui non fecerunt mentionem nisi do octo generibus. Sed ego in mari causa experimenti navigans et exiens ad insulas et harenas, manibus collegi decem vel undecim genera." (Saint Albert, *De animalibus*, [ed. Stadler, *Beitrage zur Geschichte der Philosophie des Mittelalters*, vols. 15-16, 1916-1920], IV, tr. 1, chap. 1, p. 357.)

The question may be asked: What value is there in studying this problem? Certainly, science has made such great progress since the times of Aristotle and Saint Albert that these men have no interest to modern times. However, a study of the relation of natural history to natural philosophy as seen by these great philosophers *is* of value. First of all, it is profitable to the Thomistic school of natural philosophy, for one of the much-disputed problems concerns the relation of Thomism to the natural sciences: Is there a specific distinction between natural philosophy and the experimental sciences? Other authors[11] who have considered this problem from the doctrines of Aristotle, Saint Albert, and Saint Thomas on the division of the sciences have concluded that no such distinction exists. A study of the natural history of Aristotle and Saint Albert and its relation to their natural philosophy is another approach to the same solution. Moreover, such a study will show that the Thomistic system is deeply rooted in reality; its conclusions regarding the composition of physical beings are such as can be verified in the natural world.

In the second place, a study of this sort may be a contribution to a *rapprochement* with the modern scientist. Certainly, the modern scientist can never be presented immediately with the conclusions of the *Physics* and *De Anima* of Aristotle and be expected to use them as a frame of reference for his scientific thought. The general conclusions about matter and form, the soul, the senses, and the intellect will be foreign to his ears. Rather, a start must be made from the part of Aristotelian-Thomistic natural philosophy which most closely approaches modern science. This field is natural history, for here Aristotle and Saint Albert have considered the same problems as the modern biologist. Classification, teleology, the effect of environment on the organism, apparent manifestations of intelligence in animals have all been treated by them. As has already been indicated, Aristotle, and to a lesser extent, Saint Albert have been accepted as important contributors to the growth of modern biology. Why cannot this be used as the common ground for a meeting of the Thomist and the modern scientist? If the Thomistic synthesis of natural philosophy developed from and embraced natural history, it demands investigation by modern biologists.

Definitions

A definition of natural philosophy present no great difficulty. Precisely stated, it is the study of all material beings under the aspect of their mobility, their change. This is to say, the natural philosopher of the Aristotelian-Thomistic school uses changes as his means to learn more about the world surrounding him. Since this phenomena of change flows from an intrinsic principle, the nature of the being, observation of the changes which the being undergoes leads to the discovery of the secrets of its inmost composition. It is with the principle *operatio sequitur esse*—a thing is as it acts—constantly in mind that the natural philosopher approaches nature's two intrinsic causes, the material cause and the formal cause.

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[11] Cf. Anicetus Fernandez-Alonso, "Scientiae et philosophia secundum S. Albertum Magnum." *Angelicum,* XIII (1936), 24-59.

However, the philosopher is not content to see the being in isolation, but seeks to learn its relation to the whole universe. To attain such knowledge he studies the extrinsic causes, the efficient cause and the final cause, which tell him what caused the motion of the being and to what goal it is moving.

To define natural history is more difficult on account of the many fields of study classified under this name. The following definition, taken from the Encyclopedia Americana, illustrates this difficulty:

> Natural history in its widest sense, that department of knowledge which comprehends the sciences of zoology, botany, chemistry, natural philosophy or physics, geology, paleontology and mineralogy. It is now, however, commonly used to denote collectively the sciences of botany and zoology, or these together with geology, mineralogy and paleontology, exclusive of physics and chemistry, and it is sometimes restricted to denote the science of zoology alone.[12]

Evidently, such a definition, although it may be necessary to include all the branches of science which have been called natural history, is inadequate for this paper. If science in this definition be taken in the acceptation which is often given today, that is, of a study that is primarily mathematical, not even under its most restricted sense, that of zoology alone, could Aristotle and Saint Albert be called natural historians. Therefore, a more careful consideration of this term must be made.

Some idea of the significance of the term may be obtained if the nominal definition as it was understood by Aristotle, the originator of the term, be given. History, for Aristotle, connotes the particular rather than the universal, which is the object of science.[13] Natural implies the actions of the being as proceeding from the inner principle, the nature, which is their cause, in contrast to the violent, which implies actions that have been forced upon the being from an external principle. Thus, from a consideration of the name, natural history is concerned with the narration of facts about specific plants and animals as they exist in their native habitat.

A more precise concept of natural history may be obtained by considering the manner in which natural history defines its object. Father Humbert Kane defines natural history as the "descriptive definition of natural things."[14] Considering the logical nature of a descriptive definition, this is the most suitable definition that can be given. A descriptive definition may be given either through a property or through a collection of accidents by which the object in question may be distinguished from all other objects, for example, the following descriptive definition may be given for the common horse fly:

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[12] "Natural History," *Encyclopedia Americana* (edition 1940), XIX, p. 768.

[13] Aristotle, *Poetics* (ed. Ross, vol. XI, *The Works of Aristotle Translated into English;* Oxford: Clarendon Press, 1908-1931), chap. 9, 1451b7. Unless otherwise noted, all references to Aristotle are from this edition.

[14] W. H. Kane, O.P., "The Nature and Extent of Natural Philosophy," *Thomist,* VII (April, 1944).

> Some of the tabanids are very large flies, almost an inch long, and the rest are at least of medium size, mostly exceeding ⅜ inch in length. The surface of the large head is mainly occupied by the eyes, which are separated by some space in the females but are touching in the males of most species. Ocelli may or may not be present. The short mouth parts are for piercing and sucking.[15]

It may also be noted here that natural history is commonly limited to living things. This is the way that the term was understood by Aristotle, who applied it to his *Historia Animalium,*[16] and by modern writers.[17]

Ultimately, all biological science is based upon descriptive definition. Taxonomy, the science of classification, uses the data given by descriptive definition to arrange organisms according to different phyla, classes, orders, etc. Ecology uses descriptive definition to consider the animal in relation to its environment. Other branches of biological science are diversified according to the particular part of the animal that they study by this method of descriptive definition. This is not to say, of course, that all the biological sciences are limited to this method of descriptive definition, but rather to indicate the dependence of all branches of biology on this method, and thus on natural history. With regard to this point, William M. Wheeler notes:

> History shows that throughout the centuries from Aristotle and Pliny to the present day, natural history constitutes the perennial rootstock or stolon of biological science and that it retains this character because it satisfies some of our most fundamental and vital interests in organisms as living individuals more or less like ourselves. From time to time the stolon has produced special disciplines which have grown into great, flourishing complexes . . . Taxonomy, morphology, paleontology, physiology began to shoot up, branch and differentiate, becoming independent specialists, developing their own methods from time to time as the investigators of different periods have been impressed by different aspects of its fundamental tendencies. Aristotle wrote of the 'histories' of animals, the naturalists of more recent centuries spoke of their 'habits'; we have become more articulate and speak of their 'behavior.' Last and most recent, and in danger of being lost in its all inclusiveness is the commonly used and convenient word substitute for natural history, 'Ecology.'[18]

Natural history may thus be said to begin with the simple observation of living things and from here to proceed in the description of them according to the purpose and disposition of the natural historian himself. This quasi-definition of natural history is verified in the great natural historians. Aristotle, a philosopher, began with careful observations of plants and animals and then considered these plants and animals in the light of the principles which his experience with them had led him to establish for his philosophy of nature. Henri Fabre observed the insects of his native France and gave us numerous volumes on their behavior. Even modern mathematical biology must begin with natural history.

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[15] Ralph B. Swain, *The Insect Guide* (Garden City, New York: Doubleday & Company, Inc., 1948), p. 195.

[16] Cf. *De Incessu Animalium,* chap. 2, 704b5: "We have to examine the reasons for all these facts, and others cognate to them; that the facts are such is clear from our Natural History, ..." A. S. L. Farquharson, the translator, notes that this reference to the *Historia Animalium* is the original of our term "natural history."

[17] Cf. H. E. Jaques, *How to Know the Insects* (Revised edition, Dubuque, Iowa: Wm. C. Brown Co., 1947), p. 1: "Natural history deals with all *living* [italics in the original] things."

[18] W. M. Wheeler, quoted in William Beebe, *op. cit.,* p. 89.

In this paper natural history will be considered as it forms that part of the natural philosophy of Aristotle and Saint Albert the Great which is devoted to the consideration of specific plants and animals. As natural historians, Albert and Aristotle must be identified with the root-stock which has furnished the foundation for the growth of the numerous modern biological disciplines. In their works can be seen the beginnings of the many special offshoots which have sprung from the root-stock.

Finally, there is one thing which all natural historians have in common, their great appreciation of the beauty of the world about them. Aristotle describes this beauty:

> We therefore must not recoil with childish aversion from the examination of the humbler animals. Every realm of nature is marvelous: . . . so we should venture on the study of every kind of animal without distaste; for each and all will reveal to us something natural and something beautiful. Absence of haphazard and conductiveness of everything to an end are to be found in Nature's works in the highest degree, and the resultant end of her generations is a form of the beautiful.[19]

Gilbert White, the English natural historian of the eighteenth century, indicates the two functions that have been assigned to natural history, that of being, as it were, the root-stock of biology, and that of being a source of admiration and appreciation of the world about man:

> If the writer should at all appear to have induced any of his readers to pay a more ready attention to the wonder of the Creation, too frequently overlooked as common occurrences; or if he should by any means, through his researches, have lent a helping hand towards the enlargement of the boundaries of historical and topographical knowledge; . . . his purpose will be fully satisfied.[20]

With this consideration of the meaning of natural history in mind, the problem of this paper can be directly attacked.

Its Development

Natural history is found to play a double role in the natural philosophy of Aristotle. It is the aim of this paper to show how Aristotle was led by his researches in natural history to formulate his natural philosophy and how he presented these researches in the light of these principles. Therefore, the first problem to be considered in determining the relation of natural history to the natural philosophy of Aristotle and Saint Albert is the effect which Aristotle's researches on plants and animals had on the development of his natural philosophy. In order to determine this influence a brief account of his life must be given.

Born in 384 B. C., at Stagira, Aristotle was sent to Athens in 368/7 to study in the Academy of Plato. After the death of the latter he spent five years in Asia Minor and Lesbos. In 343/2 began the period of

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[19] *De Partibus Animalium,* I, ch. 5, 645a15-26.

[20] Gilbert White, *The Natural History o|f Selborne* (New York: D. Appleton and Company, 1898), p. xx.

Aristotle's tutorship of Alexander the Great, a period which lasted until about 340. He returned to Athens in 335, and during the next twelve or thirteen years he produced the philosophical works for which he is famous. Aristotle died in 322 B. C.[21]

The important matter for this paper is to determine insofar as possible the period in his life when Aristotle did most of his reasearch in natural history. According to Richard McKeon[22] this work was done during Aristotle's studies in the Academy and from the time of Plato's death until Aristotle's teaching at Athens. A legend reported in the *Natural History* of Pliny[23] tells of Alexander the Great's contributions to the researches of Aristotle.

D'Arcy Wentworth Thompson, translator of the *Historia Animalium* for the Oxford translation of the works of Aristotle, has devoted much study to the determination of the period when Aristotle performed his researches on plants and animals. His conclusion is:

> I think that it can be shown that Aristotle's natural history studies were carried on, or mainly carried on, in his middle age; that the calm, land-locked lagoon at Pyrrha was one of his favourite hunting grounds; and that his short stay at Euboea, during the last days of his life has left little, if any, impress on his zoological writings.[24]

In regard to this last statement Thompson also notes:

> It has been held that Aristotle devoted himself to biology as an old man's recreation after his retirement to Euboea. This theory is not adequate and I do not think it is true.[25]

Upon what proof do these assertions rest? From geographical references in the *Historia Animalium* Thompson has been able to assign Aristotle's natural history studies to this period. This is not to say that the works which are known as Aristotle's natural history were written at this time, but rather that the researches upon which he bases these works were made at this time. Thompson's argument is as follows:

> Among the isles of Greece there is a certain island, insula nobilis et amoena, which Aristotle knew well. It lies on the Asian side, between the Troad and the Mysian coast, and far into its bosom, by the little town of

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[21] Richard McKeon, *The Basic Works of Aristotle* (New York: Random House. 1941), pp. xiv-xv.

[22] *loc. cit.*

[23] Quoted in William Beebe, *op. cit.*, p. 19-20: "Aristotle is a man whom I cannot name, but with great honour and reverence, and whome in the historie and report of these matters I meane for the most part to follow. And in very truth King Alexander the great, of an ardent desire that he had to know the natures of all living creatures, gave this charge to Aristotle, a man singular and accomplished in all kind of science and learning, to search into this matter, and to set the same downe in writing; and to this effect commanded certaine thousands of men, one or other, throughout all the tract, as well of Asia as Greece, to give their attendance, & obey him: to wit, all Hunters, Faulconers, Fowlers, and Fishers, that lived by those professions. Item, all Foresters, Park-keepers, and Wariners: all such as had the keeping of heards and flocks of cattell: of bee-hives, fish-pooles, stewes, and ponds: as also those that kept up foule, tame or wild, in mew, those that fed poultrie in barton or coupe: to the end that he should be ignorant of nothing in this behalfe but be advertised by them, according to his commission, of all things in the world."

[24] D. W. Thompson, prefatory note to Aristotle's *Historia Animalium,* p. 7.

[25] D. W. Thompson, *On Aristotle as a Biologist,* p. 5.

> Pyrrha, runs a broad and sheltered lagoon. It is the island of Lesbos. Her[e] Aristotle came and spent two years of his life, in middle age, bringing his princess bride from the petty court of a little neighboring state where he had already spent three years. It was just before he went back to Macedon to educate Alexander; it was ten years later that he went back to Athens to begin teaching in the Lyceum. Now in the Natural History references to places in Greece proper are very few indeed; there is much more frequent mention of places on the northern and eastern coasts of the Aegean, from Aristotle's own homeland down to the Corian coast; and to places in and around that island of Lesbos, or Mitylene, a whole cluster of Aristotle's statements and descriptions refer. He speaks of the big purple Murex shells at Cape Lectum, and of the different sorts of sponges found on the landward and seaward side of Cape Malia. But it is to the lagoon at Pyrrha that Aristotle oftenest alludes.[26]

From this argument Thompson concludes:

> I take it as probable, or even proven, that an important part of Aristotle's work in natural history was done upon the Asiatic coast, and in or near Mitylene . . . Moreover, it follows for certain if all this be true, that Aristotle's biological studies preceeded his more strictly philosophical work; and it is of no small importance that we should be (as far as this is possible) assured of this, when we speculate upon the influence of his biology on his philosophy.[27]

This conclusion is of great importance when the historical background of Aristotle's philosophy is considered. Other philosophers had struggled with the problem of motion, but they had produced solutions which were at best unsatisfactory and often destroyed the validity of human knowledge. Motion had led Heraclitus to the denial of all permance, to his famous dictum "all is flux." If such is the case there can be no valid knowledge, for when the object is known it has already changed. Parmenides also struggled with this problem and denied all motion. Since change is most obvious to the senses, he too was forced to deny the validity of knowledge.

Upon being faced with this situation, Plato made his attempt to save the validity of scientific knowledge. According to him this demanded the existence of subsistent forms which were in the World of Ideas, and were in some way participated by the shadowy realities which the senses perceived. At best, Plato gave only a very vague and unsatisfactory solution.

Aristotle's Solution

This was the confusion into which Aristotle stepped. The brilliance of his solution is most evident when it is noted that he grasped the particular aspect which had given his predecessors such great trouble and made it the very object of his natural philosophy, for he assigns the object of natural philosophy as ". . . that sort of substance which has the principles of its movement and rest present in itself . . ."[28]

For Aristotle, there was one thing absolutely certain: motion existed in the world and had to be explained, not denied. The solution for him lay in the dualistic explanation of potency and act, matter and form. From whence did Aristotle derive this dualism but from his studies in natural history? A live animal and a dead animal may look the same; apparently the same flesh and bones are present. Why is the living animal a thing of beauty and the dead one soon only a mass of corrupting flesh? Through such experiences in nature Aristotle derived his dualistic explanation of life. There must have been more to the living animal than the material element; a formal element was also needed to explain its activity. A. Schwitalla shows the effect of Aristotle's biological work on his dualism:

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[26] *Ibid.*, p. 6.

[27] *loc. cit.*

[28] Aristotle, *Metaphysics,* VI, chap. 1, 1025b12-21.

> Reviewing the history of Scholastic philosophy, nothing is more striking to the present speaker than the enormous part which the concept of life, with which, after all, the biologist primarily deals, has had to do with the development of the views of the founders of Scholasticism. It is more than reasonably certain that Aristotle's dualism was founded upon observation of the organic world, and it is only from this that his dichotomy was applied to the inorganic world.[29]

Since this is the case, it is not strange that Aristotle's researches in natural history made their greatest impression on his psychology. In order to formulate the division of psychology according to the three kinds of souls, Aristotle had to turn to his researches on plants and animals for verification.

> But the facts are that the power of perception is never found apart from the power of self-nutrition, while—in plants—the latter is found isolated from the former. Again, no sense is found apart from that of touch, while touch is found by itself; many animals have neither sight, hearing, nor smell. Again, among living things that possess sense, some have the power of locomotion, some not. Lastly, certain beings—a small minority—possess calculation and thought.[30]

Where has Aristotle obtained the data upon which he based this division but in his researches in natural history?

During his many years of biological research Aristotle depended upon his senses for his knowledge of nature. It is not strange, therefore, that he should have modified the Platonic theory of knowledge, which made intellectual knowledge only a process of remembering. Experience taught Aristotle that he was dependent upon his senses even for the matter of intellectual knowledge:

> Since according to common agreement there is nothing outside and separate from sensible spatial magnitude, the objects of thought are in the sensible forms, viz. both the abstract objects and all the states and affections [*passiones*] of sensible things. Hence (1) no one can learn or understand anything in the absence of sense, and (2) when the mind is actively aware of anything it is necessarily aware of it along with an image; . . .[31]

Thus in the fundamental doctrines of Aristotle's natural philosophy can be seen the influence of his natural history studies. When he turned from plants and animals to the pursuit of his more strictly philosophical speculations, Aristotle by no means abandoned his contact with the real world, a charge that is often leveled against philosophers. Upon the solid foundation of physical reality Aristotle built his towering philosophical edifice, which terminates only in the Deity itself.

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[29] A. M. Schwitalla, "The Relation of Biology to Neo-Scholasticism," *Proceedings of the American Catholic Philosophical Association,* I (1926), 52.

[30] *De Anima,* II, ch. 3, 415a1-8.

[31] *Ibid.,* III, chap. 8, 432a3-9.

The objection may be raised that this interpretation of the influence of natural history on Aristotle is without a fundament and has been imposed to fit preconceived theories. The answer to this objection is given by the Stagirite himself:

> Lack of experience diminishes our power of taking a comprehensive view of the admitted facts. Hence those who dwell in intimate association with nature and its phenomena grow more and more able to formulate, as the foundation of their theories, principles such as to admit of a wide and coherent development: while those whom devotion to abstract discussions has rendered unobservant of the facts are too ready to dogmatize on the basis of a few observations.[32]

Natural History of Aristotle and Saint Albert

Now that the influence of natural history on the development of Aristotle's natural philosophy has been considered, a detailed study of the natural history of Aristotle and Saint Albert may be begun. The purpose of this section is not to consider their natural history precisely as it describes plants and animals, but rather to show the philosophical aspects of their natural history, and in this way to support the thesis of this paper, namely, that natural history is an essential part of Aristotelian-Thomistic philosophy.

Aristotle and Saint Albert will be treated simultaneously in this portion of the paper. Since there is close agreement between these writers, the opinions of one or the other of them will be considered when this one presents the more precise explanation of the point at hand. There is no disagreement on essentials, so the views of one may well be taken to express those of the other.

Three questions must be considered in this part of the paper: 1. What is the place in natural philosophy which Aristotle and Saint Albert assign to natural history? 2. Why did Aristotle and Saint Albert assign this place to natural history? 3. How did Aristotle and Saint Albert proceed in the scientific presentation of their researches in natural history?

What Place Has It In Natural Philosophy?

In the Aristotelian-Thomistic system of natural philosophy a twofold development is noted. There is a search for general principles, which search must begin from sense data and culminates in the most general principles of natural philosophy. Also at this level is found the determination of the methodology of natural philosophy. In the light of these general principles the second part of natural philosophy studies all of physical reality. This is not to imply that the natures of all physical beings are deduced from these principles. Rather, at every stage in this progression from general principles new data must be furnished by the senses, data which is then ordered in the light of the general principles.

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[32] *De Generatione et Corruptione*, I, ch. 2, 316a5-10.

Indeed, the farther the development of the science proceeds away from the general doctrine and the closer it gets to specific natures, the greater is the need for sensory data.

In showing the development of this system in Aristotelian-Thomistic philosophy, the plan given by Saint Albert[33] will be followed, for this shows Scholastic natural philosophy in its most extensive development.

The first treatise, the eight books of the *Physics,* considers mobile being in general. The principles which Aristotle and Albertus Magnus determine here will apply to all changeable beings. The rest of the tracts of natural philosophy are concerned with mobile beings of a particular kind. Simple bodies are considered according to whether their motion terminates in a new place (*De caelo et mundo*) or in a new form (*De generatione et corruptione*). After simple bodies have been considered, the bodies which are composed of simple parts are considered, both in the process of composition (*Meteorologica*) and as they are actually composed.

These composite beings may be either living or non-living. The non-living bodies are treated in the *De mineralibus.* Since living bodies are composed of both body and soul, separate consideration is given to each of these. The *De anima* inaugurates the treatment of the soul with the establishment of the general doctrine on the soul and its potencies.[34] Numerous smaller treatises (the *Parva naturalia*) consider the various vegetative, sensitive, and intellectual potencies of the soul.

With the section of natural philosophy devoted to the bodies of plants and animals the treatises on natural history are introduced. It must be noted that in these treatises the body is not treated as completely separated from the soul, since, as Aristotle notes,[35] the soul falls within the province of these tracts inasmuch as it is the form of the body, and no body can be considered without that which makes it to be such a body.

Since the object of this paper is to show the essential part which natural history occupies in natural philosophy as developed by Aristotle and Saint Albert, it is not sufficient to record the outline of their *corpus* of natural philosophy without considering the method of study which unifies it, lest the objection be raised that there is no real unity in their natural philosophy. If it can be shown that Aristotle and Albert used the same methodology in the natural history as in the rest of their natural philosophy, the essential unity will be demonstrated.

In the books of the *Physics* Aristotle (followed by Saint Albert) establishes not only the general principles of mobile being but also the principles of the science of mobile being. First he determines that the natural philosopher must study the objects of his inquiry by their four causes:

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[33] Saint Albert, *Physicorum Libri Octo* (ed. Borgnet, vol. III, *Opera Omnia,* Paris: Vivès, 1890-1899), I, tr. 1, chap. 4, pp. 8-9.

[34] The place of the *De Anima* in the *corpus* of natural philosophy is disputed, for some authors would place it after the works on natural history. However, Saint Albert (*Physics,* I, tr. 1, chap. 4, p. 9) and Saint Thomas Aquinas (*De Sensu et Sensato,* Lect. 1, No. 2) agree that it precedes the works on natural history.

[35] Aristotle, *De Partibus Animalium,* I, chap. 1, 641a18-641b10.

> Knowledge is the object of our inquiry, and men do not think they know a thing till they have grasped the 'why' of it ((which is to grasp its primary cause). So clearly we too must do this as regards both coming to be and passing away, in order that, knowing their principles, we may try to refer to these principles each of our problems.[36]

Then Aristotle establishes the four causes with which the natural philosopher must concern himself:

> Now the causes being four, it is the business of the physicist to know about them all, and if he refers his problems back to all of them he will assign the 'why' in the way proper to his science—the matter, the form, the mover, 'that for the sake of which.'[37]

According to these four causes Aristotle and Saint Albert will treat all natural things as they develop their philosophy of nature. As will be considered in detail later, this same method is followed in the treatises on natural history. For the present it is sufficient to indicate Aristotle's intention of using this method in his natural history. At the beginning of the *Meteorologica,* where Aristotle outlines the whole of his natural philosophy, he says:

> When the inquiry into these matters is concluded, let us consider what account we can give, in accordance with the method we have followed, of animals and plants, both generally and in detail.[38]

Thus, as pre-scientific experience, natural history leads to the formation of the most general principles of mobile being. It was in this manner that natural history led Aristotle to formulate his dualism of matter and form, as has already been shown. The scientific presentation of natural history, however, is the term of natural philosophy.

Why Is This Place Assigned?

This last statement leads immediately to the second point to be considered in this part of the paper: Why did Aristotle and Saint Albert assign this place in natural philosophy to natural history? The answer is to be found in two places, the world of nature and the human mind.

First, the world of nature must be considered. According to their plan Aristotle and Albert began with mobile being in general, that is, they established the principles which are applicable to all things that undergo sensible change. However, "mobile being in general" does not exist; only mobile being of this or that kind exists. Therefore, the different kinds of motion have to be considered. Even when the general principles of the three kinds of motion — local motion, alteration, and augmentation — have been considered, only a general treatment has been given to the very specific beings that exist in the world. For this reason Aristotle and Saint Albert had to continue until they had completed their natural history, in which the specific natures of living things are discussed. Both parts of natural philosophy are necessary: without the general treatises the individual parts remain hopelessly diverse; without the specific treatises the general tracts tell us little about reality.

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[36] *Physics,* II, ch. 3. 194b16-24.

[37] *Ibid.,* chap. 7, 198a23-25.

[38] I, ch. 1, 339a6-7.

Secondly, the human intellect must be considered. The human mind can know things only insofar as they are in act, or are perfect. The general conclusions of natural philosophy are more potential, that is, they contain many conclusions in potency, conclusions which the human intellect desires to know. For example, when Aristotle determined that prime matter and substantial form are the principles of mobile being, potentially he stated that the soul and matter compose the living body, and also gave the nature of every mobile being. Is the human intellect satisfied with this general doctrine? Of course not! It does not rest content until it has learned as much as it can about each kind of mobile being in particular. Saint Albert develops this point in the following manner:

> Nevertheless, narration of this kind concerning the science of animals in general, as far as the doctrine which we are now treating, is latent and not manifest or determined. I say that it is latent in the principles placed in those books [that is, the principles which Saint Albert has established in his treatises *De Anima* and the *Parva Naturalia*], which principles are too general for this science about the natures of particular animals. I call it not manifest in the science of conclusions, for to know the natures of things in general is to know them only potentially, because the narration of doctrine of this kind is indeterminate and not proper to the natures of animals and their accidents. Therefore, it is evident that we must here begin another science which treats of the properties belonging to each, for otherwise the study of natures will not have been perfectly presented by us.[39]

Thus the answer to the question is clear. Natural history is placed at the end of the *corpus* of natural philosophy because it is the final perfection of the science both from the point of view of the physical world and from the point of view of the human mind. When the treatises on natural history have been completed, Aristotle and Saint Albert have treated all of the physical universe in general and in particular. The general principles of the physical world are known and the particular natural beings are seen in relation to these general principles. Only then can the human intellect rest content.

How Is It Presented?

The natural history of Aristotle is presented in three works: *Historia Animalium, De Partibus Animalium,* and *De Generatione Animalium.* Two other treatises were to complete this series, a treatise on anatomy,[40] which was actually written but has not come down to the present time, and a treatise on plants,[41] of which nothing is known.

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[39] "Tamen sermo habitus tali modo scientiae animalium in communi, quantum ad istam doctrinam in quo modo sumus, latens est et non manifestus neque determinatus. Latentem autem dico in principiis in illis libris positis, quae nimis sunt communia ad hanc scientiam de naturis particularium animalium. Non manifestum autem voco in scientia conclusionum, quoniam scire in universali naturas rerum non est scire eas nisi in potentia, eo quod est hujusmodi sermo doctrinae indeterminatus et non appropriatus naturis animalium propriis et accidentibus eorum. Sic igitur manifestum est quod oportet nos hic scientiam aliam inducere, quae sit per propria singulis convenientia, quia aliter doctrina naturarum a nobis non erit perfecte tradita." (Saint Albert, *De Animalibus,* XI, tr. 1, p. 765.)

Saint Albert's natural history is contained in two works, *De Animalibus* and *De Vegetabilibus et Plantis.* The former work consists of a commentary on the three Aristotelian works on animals, two books of Albert's own composition devoted to the nature of the bodies of animals and the perfection and imperfection of animals, and five books devoted to a catalogue of the animals known to Albert. *De Vegetabilibus et Plantis* is a commentary on a pseudo-Aristotelian work, to whose two books Saint Albert added five of his own composition.[42] In this work Albert also compiled a catalogue of the plants known to him.

Great stress is laid on actual observation of natural things in order to develop a natural history. Aristotle declares that observation is absolutely necessary:

> For it is sense perception alone which is adequate for grasping the particulars: they cannot be the objects of scientific knowledge because neither can universals give us knowledge of them without induction, nor can we get it through induction without sense perception.[43]

Saint Albert is even more forceful in asserting the same point:

> For he who neglects motion and the senses in nature is preparing to deceive himself and others, since all of nature is composed of things which are perceivable by the senses and subject to change.[44]

Moreover, when introducing his catalogue of plants, he states:

> Of these [plants], however, which we shall consider, certain, indeed, we have found by experience.[45] Certain we give according to the word of those whom we have found do not easily relate something unless they have experienced it. Experience alone gives certitude in such matters . . .[46]

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[40] Aristotle refers to this treatise in the *De Partibus Animalium* and indicates that both it and the *Historia Animalium* were illustrated. Cf. the following passage from the *De Partibus Animalium,* IV, chap. 5, 680a1-3: "The details, however, of these differences must be looked for in the Researches concerning Animals [*Historia Animalium*] and the treatises on Anatomy. For while there are some points which can be made clear by verbal demonstration, there are others which are more suited for ocular demonstration."

[41] Aristotle indicates in his *Meteorologica* that a treatise on plants is necessary to complete his work in natural philosophy. Cf. that text cited in Note 38.

[42] Only Books II and IV are based on the *De Vegetabilibus* of Nicholas of Damascus, which was ascribed to Aristotle.

[43] *Posterior Analytics,* I, chap. 18, 81b5-9.

[44] "Qui enim in natura rationes motus et sensus negligit, cum tota natura sit de sensibilibus et mobilibus, parat se ad decipiendum se et alios." (Saint Albert, *In II Sententiarum* [ed. Borgnet, vol. XXVII, *Opera Omnia;* Paris: Vivès, 1890-1899], dist. 1, art. 4, p. 14.)

[45] For the meaning of "experience" (experimentum) in Saint Albert, cf. Meersseman, *Introductio in Opera Omnia B. Alberti Magni* (Bruges, Belgium: Charles Beyaert, 1931), p. 10: "Experimentum autem apud Albertum significat tum id quod moderni observationem appellant, cum illud quod proprie experientiam vocant, seu examen facti arte provocati."

[46] "Earum autem quas ponemus, quasdam quidem nos experimento probamus. Quasdam autem referimus ex dictis eorum quae comperimus non de facili aliqua dicere nisi probata per experientiam. Experimentum enim solum certificat in talibus . . ." *De Vegetabilibus et Plantis* [ed. Borgnet, Vol. X, *Opera Omnia;* Paris: Vivès, 1890-1899], VI, tr. 1, chap. 1, p. 159-160.)

Not only theoretically but also practically Saint Albert emphasized the importance of observation. Stadler[47] lists one hundred and eighteen places in the *De Animalibus* where Albert expressly states that he has observed a certain phenomena. Many of these places are those where Saint Albert cites his observations against the authority of the ancients, including Aristotle and Pliny.

In a paper of this sort only a few examples may be given. Familiar to anyone who has walked along a sandy beach is that of the ant-lion:

> The ant-lion is called the "lion of the ants," which is called by another name *murmycaleon.* However, this animal is not first an ant, as certain people say. For I have experienced many times, and I have shown my comrades that this animal has pits in the shape of a hemisphere, whose pole is the mouth of the ant-lion, which pits it digs in the sand and in which it hides. When the ants pass over them while seeking prey it captures and devours them, and we have often seen this.[48]

Saint Albert's observations were not limited to animals easily accessible; he searched the seas[49] and even climbed mountains to obtain his information:

> And a great eagle, which among us is called *herodius,* is rarely found to have more than one young, although it lays two eggs. And I found this to be true by visiting the nest of a certain eagle continuously for six years. But it is difficult to obtain personal experience in such matters on account of the height of the mountains in which they build their nests: nor were we able to experience this except by descending on a rope of great length let down from a rock above. Such is the custom among us of those who take falcons and eagles from their nests.[50]

Would that Aristotle had given us a similar description of his discoveries! Truly, to read Saint Albert is to be at the side of one of the great naturalists in the history of science.

Since Aristotle and Saint Albert were interested not only in the data which they had obtained, but also in a philosophical consideration of these facts, both devote a considerable amount of space to the discussion of the way in which the philosophical treatment of their researches should be presented. This matter is handled chiefly in the first book of Aristotle's *De Partibus Animalium* and in Saint Albert's commentary on the same, but other relevant passages are found in the *Historia Animalium* and *De Generatione Animalium.*

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[47] Herman Stadler, editor, *Albertus Magnus: De Animalibus libri XXVI, (Beiträge zur Geschichte der Philosophie des Mittelalters,* vol. XVI), p. 1598.

[48] "Formicaleon dicitur leo formicarum qui alio nomine murmycaleon vocatur. Hoc autem animal non est primo formica ut quidam dicunt. Expertus enim sum multoties et ostendi sociis hoc engulas fere habere figuram et absconditur in sabulo semisperam fodiens cujus polus est os formicaleonis: et dum formicae causa lucri transeunt, ipsas capit et devorat et hoc saepe aspeximus." *De Animalibus,* XXVI, p. 1586.)

[49] Cf. the text cited in Note 10.

[50] "Aquila etiam magna, quae apud nos est et herodius vocatur, raro apud nos invenitur habere nisi unicum pullum, licet duo faciat ova. Et hoc jam comperimus per sex annos continuos visitando nidum aquilae cujusdam. Sed in talibus difficile est experiri propter altitudines montium, in quibus nidificant: nec potuimus experiri nisi desuper quodam submisso in fune maximae longitudinis de rupe. Talis est usus apud nos eorum, qui falcones et aquilas de nidis accipiunt." *De Animalibus,* VI, tr. 1, chap. 6, p. 461.)

The first problem which concerned Aristotle was the way in which his data was to be arranged: should he begin with the consideration of the individual species, or should he first treat those properties which are common to all or several species. Aristotle decided in favor of the latter course, since this avoided endless repetition. This had been Aristotle's procedure throughout the whole of his natural philosophy, for in the *Physics* he had said:

> Thus we must advance from generalities to particulars, for it is a whole that is best known to sense perception, and a generality is a kind of whole, comprehending many things within it, like parts.[51]

The second problem concerned the proper method of treating the matter itself, once it had been arranged in this way. As has already been indicated,[52] the proper method for the natural philosopher was shown by Aristotle to be a study of natural things according to their four causes—the material cause, the formal cause, the efficient cause, and the final cause. In the first book of *De Generatione Animalium* Aristotle recapitulates his doctrine on the four causes:

> There are four causes underlying everything: first, the final cause, that for the sake of which a thing exists; secondly, the formal cause, the definition of its essence (and these two we may regard pretty much as one and the same); thirdly, the material; and fourthly, the moving principle, or the efficient cause.[53]

Immediately after this passage Aristotle shows that three of these causes have already been treated, and only the efficient cause remains to be considered. Thus the same four causes are to be treated in the scientific presentation of natural history as were appointed in the *Physics* as the proper method for the natural philosopher. Separate consideration must now be given to each of these causes as it is treated by Aristotle and Saint Albert in their natural history.

With regard to the material cause Aristotle notes that the ancient natural philosophers were interested primarily in it and the efficient cause:

> Now that with which the ancient writers, who first philosophized about nature, busied themselves was the material principle and the material cause . . . They say, for instance, that the water contained in the body causes by its currents the formation of the stomach and the other receptacles of food or of excretion; and that the breath breaks open the outlets of the nostrils; air and water being the materials of which bodies are made; for all represent nature as composed of such or similar substances.[54]

For Aristotle such treatment is inadequate. To treat of the material cause properly, not merely earth, air, fire, and water must be considered, for these are the material cause of only the homogeneous parts, or those parts which today are called tisues. The homogeneous parts themselves must be studied, for they are the material cause of the heterogeneous parts, that is, those parts which are now known as organs. These heterogeneous parts must also be studied, for they are the material cause of the whole animal.

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[51] Aristotle, *Physics,* I, chap. 1, 184a24-26.

[52] Cf. the texts cited in Notes 36 and 37.

[53] I, ch. 1, 715a3-6.

[54] *De Partibus Animalium,* I, chap. 1, 640b3-6.

The efficient cause of animals is found in generation; to treat of generation is the same as considering the efficient cause.

Treating of the formal cause, Aristotle notes that it is the soul which constitutes the animal to be such an animal, and this cause is therefore of greater importance than the material cause:

> . . . inasmuch as it is the presence of the soul that enables matter to constitute the animal nature much more than it is the presence of matter which so enables the soul, the inquirer is bound on every ground to treat of the soul rather than of the matter.[55]

This statement seems to create a difficulty, for what difference will there be between the study of the soul in *De Anima* and the study of it in the natural history? However, natural history studies the soul not in itself, but as it is the formal cause of the body of the plants or animals. Not the whole soul is studied, but only that part of it which is the principle of the plant or animal functions, as the case may be.

Importance of Final Cause

It is to the final cause that Aristotle and Saint Albert assign the most importance. Throughout the first book of the *De Partibus Animalium* and in the eleventh book of the *De Animalibus,* Aristotle and Saint Albert reiterate the primacy of the final cause and note that it may be considered almost identical with the formal cause.[56]

What is the significance of this emphasis on the final cause? How can the formal and the final cause be identified? These two questions must now be answered.

Since the final cause is a much-misunderstood cause, it is well to consider this cause in its general aspects before giving an application of the final cause to a more particular problem. The final cause is defined as "that for the sake of which something is done." It is the reason why the other actions in the series take place. Saint Albert and Aristotle both note that the existence of a final cause is made manifest to us because certain actions take place repeatedly in the same manner. Thus, if a certain spider is observed to build a web into which insects fly and are trapped, and if this action happens not once but many times, the only conclusion that can be drawn is that this web was built with the definite purpose of providing the spider with food.

As Saint Albert notes, the final cause is the *causa causarum,*[57] the "cause of causes"; ultimately it determines that the other causes be as they are. This means that the final cause determines that the agent, or efficient cause, act in a determined way, use determined materials (the material cause) according to the end that is desired, and strive to produce a determined (formal cause) type of object. He also concisely answers the problem of the importance of the final cause in the following passage from *De Animalibus:*

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[55] *Ibid.,* 641a27-30.

[56] Cf. the text cited in Note 53.

[57] XI, tr. 1, chap. 2, p. 765.

> Indeed, the end of generation is the form giving existence, on account of which form the material and the efficient cause possess their necessity, necessity of supposition, I mean, of which we spoke above. However, the end of the thing generated and already existing is the proper operation of every species of animals and of every member of the animal, on account of which operation it was made, and on account of which the figure and the form is necessary by necessity of supposition, which we said above was the third kind of necessity: and this is the final cause which must be assigned in the figures of the members, for no substance or part of substance at all is devoid of a proper operation.[58]

The meaning of this text may be illustrated by the example of a common insect, the red-legged grasshopper.[59] The final cause, or the reason for the sake of which, of the generation of this grasshopper is the production of a living grasshopper. This form to be produced necessarily calls for certain other causes, necessarily, that is, by necessity of supposition: given a determined form to be produced, certain determined matter must be used, and certain determined generative processes must take place. The form of this grasshopper calls for long legs, antennae, and large wings, among other features. To obtain these, its nymph, or immature form, passes through a series of five changes. At first it lacks wings, and the proportions of the parts of its body are different from those of the adult of the species. After each of these five changes it becomes more like the adult. That which governs this entire process is the final cause, the new form to be generated. The internal structural changes, the development of new tissues, and the successive changes of the skin are all governed by the final cause.

The final cause of the grasshopper generated, according to Saint Albert, is the proper operation of the animal generated and of each of its parts. Thus, the long legs of the grasshopper are to enable it to move rapidly, and their form and figure are such as will fulfill this function.

There remains the problem of how the final cause may be identified with the formal cause. In generation there is no difficulty, for the form of the animal to be generated is the final cause of the process of generation. The animal that has already been generated poses more of a problem. An additional text from the *De Animalibus* throws light on the problem:

> . . . and we must say on account of what power of the soul such parts are and have existence, for that power is the form on account of which they exist, as has been said in the science concerning the soul, that if the eye were the animal, sight would be its form.[60]

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[58] "Finis quidem generationis est forma dans esse, propter quam necessitatem habet materia et efficiens, necessitatem dico suppositionis, de qua supra diximus.

Finis autem rei generatae jam existentis est operatio propria cujuslibet speciei animalis et cujuslibet membri animalis, propter quam factum est, et propter quam figura et forma est necessaria, necessitate suppositionis, quam tertiam necessitatem esse diximus superius: et haec est causa finalis assignanda in figuris membrorum, quoniam nulla omnino substantia aut pars substantiae propria destituta est operatione." (*Ibid.* tr. 2, chap. 2, p. 797).

[59] *Melanoplus femur-rubrum:* cf. Comstock, *An Introduction to Entomology* (ninth edition, Ithaca, New York: Comstock Publishing Company, 1947), pp. 175-76.

[60] ". . . . et oportet nos dicere, per quam virtutem animae sint et esse habeant tales partes, quoniam illa virtus est forma propter quam sunt, sicut in scientia de anima dictum est, quod si oculus esset animal, visus esset forma ipsius: . . ." (XI, tr. 1, chap. 3, p. 771.)

Very important in the consideration of these two statements and the whole problem in general is the fact that it is intrinsic finality with which Aristotle and Saint Albert are concerned at this point, that is the finality of the animal considered in itself and not as a part of the whole universe.

Solution

With these prenotes in mind, a solution can be reached. Saint Albert noted in the first passage that the final cause of the animal is its proper operation, and the final cause of each of its parts is its own proper operation. The second passage carries the process further back and gives the potencies of the soul as the final cause of the parts. Because of the intimate connection between the soul and its potencies (for the soul is the material-formal cause of the potencies and can operate only through them) the soul may be called the final cause of the parts of the animal as well as the formal cause. To illustrate this by the example of the grasshopper: the grasshopper has very long hind legs, which are used to produce a definite sort of local motion. The final and formal cause of these legs is the soul of the grasshopper, which soul has a potency for local motion of a certain sort. In the same way all the operative potencies of the animal are both the final and the formal cause of the operative parts; these potencies require a corporeal organ of a very definite sort to perform their specific functions.

In this manner Aristotle and Saint Albert determined the way in which the four causes were to be treated in the scientific presentation of natural history. How well did they fulfill the canons which they established? A brief consideration of the application of the doctrine on the four causes is now in order.

From internal evidence[61] and from the order in which these works are found in the *De Animalibus* of Albertus Magnus[62] the order of these works is *Historia Animalium, De Partibus Animalium,* and *De Generatione Animalium,* Aristotle had a twofold purpose, to familiarize his listeners with the animals whose causes were to be treated and to consider the material cause.

As Aristotle indicated in the Physics, the proper procedure in natural philosophy is to begin with that which is more known to the listener and to proceed from this to the less known.[63] In establishing the basic principles of natural philosophy, Aristotle began with the phenomena that are a matter of common knowledge to everyone, such as motion, time, and space, and he then subjected these to a critical study in order to explain them. Since such things are known to all, there was no need to give a lengthy series of prenotes to acquaint his hearers with the problems to be treated. In the general treatise on the soul Aristotle followed the same method; working from the common experiences of sensation and intellection, he led his hearers to a knowledge of the soul.

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[61] The following texts sufficiently illustrate this point: "The nature and the number of parts of which animals are severally composed are matters which have already been set forth in detail in the book of Researches about Animals [i.e., the *Historia Animalium*]." (*De Partibus Animalium,* II, chap. 1, 646a6-10).

"How these part are related to each other in position and shape must be looked for in the treatises on Anatomy and the Researches concerning Animals." (*Ibid.,* III, chap. 5, 678b23.)

"The reason for this will be given in the treatise on the Generation of Animals." (*Ibid.,* IV, chap 12, 695a25-26.)

[62] Cf. the text cited in Note 9.

[63] Cf. *Physics,* I, chap. 1, 184a17-19: 'The natural way of doing this is to start from the things which are more knowable and obvious to us and proceed toward those which are clearer and more knowable by nature; for the same things are not 'knowable relatively to us' and 'knowable' without qualification."

In presenting a scientific treatment of the animal world, Aristotle and Saint Albert can no longer presuppose such a general acquaintance on the part of his hearers. How many of his hearers had the detailed knowledge of the squid or the octopus which he would demand in his lectures on the causes of these animals? Therefore, it is necessary for Aristotle first to explain the structure and the habits of the animals which will be treated in the two other works on natural history. The texts which have been cited above show that Aristotle conceives the *Historia Animalium* to fill this need.[64]

At the same time that Aristotle furnishes his hearers with the necessary background for further study, he also considers the material cause of the animals, for the parts of the animals are their material cause.

It may seem at first that to assign the material cause to the *Historia Animalium* is erroneous, for Aristotle makes the following statement in this work:

> The preceding statements, then, have been put forward [i.e., he there has given a quick survey of the entire animal kingdom] as a kind of foretaste of the number of subjects and of the properties that we have to consider in order that we may first get a clear notion of distinctive characteristics and common properties. By and by we shall discuss these matters with greater minuteness.
>
> After this we shall pass on to the discussion of causes. For to do this when the investigation of details is complete is the proper and natural method, and that whereby the subjects and the premises will afterwards be rendered plain.[65]

From this text the apparent conclusion is that none of the causes are to be treated until the *De Partibus Animalium.* However, when the arrangement of the *Historia Animalium* is considered, as will be done shortly, it is evident that a very scientific treatment has been given to the animals, for they are arranged according to structural resemblances. This is certainly evidence of the treatment of the material cause. This opinion can be supported by a number of statements made by Aristotle and Saint Albert. The Stagirite begins the second book of the *De Partibus Animalium* by saying:

> The nature and the number of parts of which animals are severally composed are matters which have already been set forth in detail in the book of Researches about Animals. [i.e., *Historia Animalium*] We have now to inquire what are the causes that have determined this composition, as a subject quite distinct from that dealt with in the Researches.[66]

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[64] Cf. the texts cited in Note 61.

[65] *Historia Animalium,* I, chap. 6, 491a1-13.

[66] *De Partibus Animalium,* 2, chap. 1, 646a8-12.

Thus Aristotle indicated that the parts of the animals, which as has already been shown, he called the material cause, have already been treated, and now the causes which have determined their composition must be considered. Saint Albert, in his commentary on this passage declares:

> Now, however, in the twelfth book of this science, we wish to consider the causes on account of which [*propter quas*] each member was created.[67]

The phrase *propter quas* may be taken for final causality and its close relation with formal causality.[68] As shall be seen later, these two causes are the ones which Aristotle treats in the *De Partibus Animalium.*

The *Historia Animalium* admirably fulfilled the purpose which its author had in mind, and Saint Albert, for his part, expanded it greatly.[69] Its observations cover all of the animal kingdom that can be observed with the naked eye, the only scientific instrument that Aristotle possessed.

This work begins with a rapid survey of the entire animal kingdom[70] to give the student a general idea of what natural history will consider. Then follows a detailed description of the internal and external parts of man.[71] Here again Aristotle follows his method of beginning with that which is well known to his hearers; using the parts of man as a basis for comparison, he gives a general description of the other animals.[72] The parts concerned with generation are then considered,[73] after which follows an extended treatment of the homogeneous parts, or tissues.[74]

Up to this point Aristotle has confined his study chiefly to the "sanguineous animals," a group which corresponds roughly to the modern subphylum of the vertebrates. Now he turns his attention to the "non-sanguineous animals," a group that approximates the non-vertebrates of modern biology.[75] Turning again to animals in general, Aristotle devotes several chapters[76] to the consideration of the senses in animals, sleep, voice, and sex. Two books[77] are devoted to the generative processes in animals and one to these processes in man.[78] The last two books contain an extended description of the habits of animals, such as feeding, migration, hibernation, disease, etc.

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[67] "Modo autem in libro duodecimo istius scientiae volumus declarare causas propter quas fuit creatum quodlibet membrum." *De Animalibus,* XII, tr. 1, chap. 1, p. 798.)

[68] Cf. this text from the *De Animalibus,* XV, tr. 1, chap. 1, p. .: ". . . causa propter quid, quae est finis . . ."

[69] For example, the first book of Aristotle's *Historia Animalium* has seventeen chapters. The first book of Albert's *De Animalibus,* a commentary on Aristotle, is divided into three tracts containing a total of forty-one chapters, of which seventeen are entirely proper to Saint Albert. In the course of his commentary Albert quotes other authorities and does not hesitate to correct Aristotle where he deems the Stagirite wrong.

[70] Bk. I, chaps. 1-6.

[71] Bk. I, chaps. 6-17.

[72] Bk. II.

[73] Bk. III, chap. 1.

[74] Bk. III, chaps. 2-22.

[75] Bk. IV, chaps. 1-8.

[76] Bk. IV, chaps . 9-11.

[77] Bks. V and VI.

[78] Bks. VII and IX; Bk. X is now considered as spurious, but Saint Albert included it in his *De Animalibus.*

The final and the formal cause are treated in the *De Partibus Animalium.* If this work is examined, it will be seen that Aristotle and Saint Albert devote most of their consideration to the adaptation of the different parts to the kind of life which the animal leads. This shows the final and formal cause, for as was noted above, all of the parts exist for the soul, which is the formal and final cause. Using the principle *operatio sequitur esse*—a thing is as it acts—, the naturalist goes from the operation of the plant or animal to the potencies of the soul and the soul itself.

The efficient cause is treated in the *De Generatione Animalium,* as is evident from Aristotle's own statement:

> It remains to speak of those parts which contribute to the generation of animals and of which nothing definite has been said, and to explain what is the moving or efficient cause. To inquire into this last and to inquire into the generation of each animal is in a way the same thing; and, therefore my plan has united them together, arranging the divison of these parts last, and the question of generation next to them.[79]

After Aristotle had considered how the four causes were to be treated, one problem still remained to be determined in the methodology of his natural history. This was the problem of classification of living beings, which is treated in the second, third, and fourth chapters of the first book of the *De Partibus Animalium.* In opening this treatment, Aristotle noted that the common method of classification was bipartite division. For example, animals might be divided into land and water animals; then the land animals divided into two-footed and four-footed. The two-footed could be subdivided into feathered and non-feathered. For Aristotle this method was unsatisfactory, and his arguments against it were numerous. First, it results in the division of natural groups: in the above-mentioned dichotomy some birds would be placed among the land animals and others among the water animals. Secondly, privative terms would form one branch of some divisions and could not be divided into species: feathered can be divided into barbed and non-barbed, but non-feathered cannot be divided, for such a division would result in such ridiculous divisions as not-feathered-with-barbed-feathers and not-feathered-with-not-barbed-feathers. After these arguments and numerous others Aristotle concluded to the correct method of classification:

> The method we must adopt is to attempt to recognize the natural groups, following the indications afforded by the instincts of mankind, which led them for instance to form the class of Birds and the class of fishes, each of which groups combines a multitude of differentiae, and is not defined by a single one as in a dichotomy.[80]

In connection with this problem of classification it is interesting to note that the problem was considered so carefully centuries before Linnaeus. An even more remarkable fact is that Saint Albert has the beginnings of a binomial system of nomenclature in his list of the birds known to him.[81] It was not until the time of Linnaeus that such a system was perfected.

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[79] I, chap.. 1, 715a11-17.

[80] *De Partibus Animalium,* 1, chap. 3, 643b10-13.

Aristotle's scientific account of his studies in natural history ended with the fifth book of the *De Generatione Animalium,* but Saint Albert added seven more books to the Aristotelian works to complete his *De Animalibus.* Two of these books are devoted to the bodies of animals (XX) and to the perfection and imperfection of animals (XXI). The last five are devoted to alphabetical catalogues of animals.

At the beginning of this series of catalogues Saint Albert gives the reason for them and notes that in his method of arranging them he is not proceeding in a philosophical manner:

> We, however, at the beginning of another book will place certain natures according to their proper names in alphabetical order. For although this is not proper to philosophy, as we said above, because it is necessary to repeat the same things often, however, because we recognize that we are debtors to the learned and the unlearned, and because those things which are said in a particular fashion about particular natures better instruct an unlearned group, we shall place such a tract at the end of our book, arranging the natures according to the letters which begin the name of each animal.[82]

In these books Saint Albert presents a brief description of over four hundred and seventy-five animals, comprising the quadrupeds (Book XXII), birds (XXIII), including a treatise of thirty-eight chapters on falcons, aquatic animals (XXIV), serpents (XXV), and worms (XXVI), under which term Saint Albert includes the insects. In *De Vegetabilibus et Plantis* Saint Albert compiles a similar catalogue of plants (Book VI).

Answer to Objections

From this study of the natural history of Aristotle and Saint Albert it is evident that natural history is an essential part of natural philosophy. Several objections, however, may be raised against this thesis. The first objection is that Saint Thomas Aquinas, who brought the natural philosophical heritage of Aristotle and Saint Albert to its perfection, pays no attention to natural history. This objection is answered by Saint Thomas himself. Although he has no treatises devoted to natural history, he admits that such treatises are necessary for natural philosophy. In commenting on the passage in the *Meteorologica* where Aristotle briefly outlines his entire *corpus* of natural philosophy from the *Physics* to the tracts on natural history,[83] Saint Thomas gives the *raison d'etre* of natural history:

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[81] Cf. Killermann, *op. cit.,* p. 26.

[82] "Nos tamen adhuc sub alterius libri principio specialiter secundum ordinem nostri alfabeti quasdam sub nominibus propriis ponemus naturas. Quamvis enim hunc modum non proprium phylosophiae supra esse diximus, eo quod in eo saepe eadem reiterare oportet, tamen quia sapientibus et insipientibus nos esse recognoscimus debitories, et ea qua particulariter de particularibus narrantur, rusticam melius instruunt contionem, talem in fine nostro libro tractatum apponemus, incipientes ab hiis quae singulis literis in principio praenotantur animalibus." *De Animalibus,* XXII, tr. 1, chap. 1, p. 1349.)

[83] Cf. Aristotle, *Meteorologica,* I, chap. 1, 338a.

> As in natural things nothing is perfect when it is in potency, but only then is it simply perfect when it is in its ultimate act; when indeed it is midway between pure potency and pure act, then it is *secundum quid* perfect, not simply perfect, however; thus also is the case with regard to science. Science which is about a thing in a universal manner is not complete science in its ultimate act, but is midway between pure potency and its ultimate act. For someone knowing something in a universal manner indeed knows in act some of the things which are in its proper *ratio:* other things one who knows universally, knows not in act but in potency. For example, he who knows man only insofar as he is animal, knows only a part of the definition of man in act, namely, his genus; he does not actually know the differences which constitute the species, but only knows them potentially. Whence it is manifest that the completion of the science requires that it does not rest in common things, but that it proceed all the way to the species: . . .[84]

From this text it is apparent that Saint Thomas agreed with Aristotle and Saint Albert on the need for natural history in natural philosophy, although he himself wrote nothing in this field.

The second objection is based upon the relation of natural science and natural philosophy today. It is evident that there is at best only the beginning of a redintegration of the natural sciences with natural philosophy. If the thesis of this paper were true, the objection is raised, this divorce would not exist. To answer this objection it is necessary to turn to the period following Saint Albert and Saint Thomas. At that time Scholasticism became involved in internal strife and failed to follow the footsteps of the great masters. As Abbé Liechty explains:

> The character of the discussions which absorbed all the intellectual force of the fourteenth century shows us the decadence of Scholasticism. This decadence came from the preponderance of the ancient tradition, which was unlimited by any historical criticism. No one was concerned with knowing what development anterior to his speculations had led Aristotle to formulate his fundamental ideas, and if these ideas would be upheld apart from this historical basis. They were content to accept them as if they were dogmas, but they disputed over the many conclusions which they could draw from them. Thus no one sought to know from what experimental constitution of reality came the necessity of distinguishing matter and form in it; . . .[85]

Thus, when Europe was ripe for the development of the experimental sciences, the philosophers had long forgotten the stress laid by Aristotle and Saint Albert on actual observation and experiment. Natural Philosophy underwent an internal split, with the complete divorce of natural science from natural philosophy as its result.

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[84] "Sicut in rebus naturalibus nihil est perfectum dum est in potentia, sed solum tunc simpliciter perfectum est, quando est in ultimo actu; quando vero medio modo se habens fuerit inter puram potentiam et purum actum, tunc est quidem secundum quid perfectum, non tamen simpliciter; sic et circa scientiam accidit. Scientia autem quae habetur de re tantum in universali, non est scientia completa secundum ultimum actum, sed est medio modo se habens inter puram potentiam et ultimum actum. Nam aliquis sciens aliquid in universali, scit quidem aliquid eorum actu quae sunt in propria ratione ejus: alia vero sciens in universali non scit actu, sed solum in potentia. Puta, qui cognoscit hominem solum secundum quod est animal, solum scit sic partem definitionis hominis in actu, scilicet genus ejus; differentias autem constitutivas speciei nondum scit actu, sed potentia tantum. Unde manifestum est quod complementum scientiae requirit quod non sistitur in communibus, sed procedatur usque ad species . . ." (*In Meteorologica* [ed. leonina, vol. III, *Opera Omnia;* Roma: Typ. Polyg., 1886] I, sect. 1, No. 1.)

[85] Abbé Liechty, *Albert le Grand et Saint Thomas d'Aquin* (Paris: Charles Douniol, 1897), p. 82.

In conclusion, this paper has shown that from its very origins Aristotelian-Thomistic natural philosophy has included natural history; in fact, it has depended upon it for its origin and its perfection. Since this is the case, a challenge is thrown to contemporary Thomism. It has the answers to modern problems in biology, but these answers must be presented in such a way that the modern biologist can see their relevancy. Once before Thomism was not awake to the crisis of developing science; this must not happen again!

Dennis Zusy, O.P.

ST. JOHN CHRYSOSTOM

"STOP FIGHTING with shadows and answer my question." The question and the rebuke following it were directed at St. John Chrysostom. The question was: why had he refused to accept his nomination as a bishop? The "shadows" mentioned in the rebuke were the praises that he was heaping on the head of his modest friend, Basil, to induce him (Basil) to accept that very office of bishop.

John and Basil were close friends, and in their student days they had formed a holy companionship for the purpose of seeking evangelical perfection together. However, their sanctity of life and outstanding virtue had singled out both of them for nomination to the episcopacy at the same time. John realized that he was not yet ready for the responsibilities of such an office, and at the same time was certain that his friend Basil was eminently fitted for such a dignity. Consequently, he induced Basil to accept the nomination by showing that Basil would be wasting the talents God had given him and would be depriving the Church of a wise and holy leader if he should refuse—these were the "shadows" that Basil objected to. When questioned as to why he himself had not accepted the nomination, John replied with a discourse on the exalted nature of the office of bishop and the high perfection required in it, with the implication that he was not yet fitted for such a post.

This incident is related in the most celebrated of St. John Chrysostom's literary works, *The Priesthood.* It highlights St. John's reverence for the office of bishop, and when he himself in later years was again called to the episcopal state he endeavored to pattern his every act after his lofty ideal.

St. John was born in 344 A.D., the son of Secundus, a high officer in the army of Syria, and Anthusa, a Christian woman of courage. While still an infant he was left alone with his mother by the untimely death of his father. Disdaining a second marriage, the young widow lavished her attention on her youthful son and gave all her attention to his training. He received the best education that Antioch, the third ranking Christian city of that time, could offer. In after years, St. John often expressed his gratitude for this unselfish act of motherly devotion. Nevertheless, such love was not without its price for Anthusa's pleading and tender regard for him delayed his entrance into the monastic life for several years.

As Monk and Priest

In 373 John entered upon the life of a monk of the desert. Four years of vigorous application to fasting and penance convinced him that the daily rigors of such a life would end his career abruptly. He therefore came out of the desert and for the next two years lived the life of a cave-dwelling hermit, a solitary life of prayer and study. The four years of over-enthusiastic application to penance had weakened his health but strengthened his spirit. Now after these additional years of retirement, he had finally found his vocation. He was to be a priest, and in 381 he was ordained a deacon. In those days the deacons held an important office in the life of the Church because it was they who, by appointment of the bishop, distributed the alms of the Church among the poor. Such work brought John into close contact with men who needed God as well as food. He came to understand the people, who were suffering from a poverty of spirit even more than from a poverty of the flesh. During these years he developed that sympathy for the common people which in later years was to help him speak with a depth of feeling that profoundly stirred his audience. He came to understand all the needs of their human hearts, hearts that were to rise in sympathy with his own to the heights of divine love. He was truly to earn the title of *Golden-mouthed Orator.* It was the pure, glittering gold of his words that moved sinners to repentance and love of God.

In 386, at the age of forty, St. John was ordained a priest. Recognizing his zeal and ability as a preacher, Flavian, the bishop of Antioch, made him the official preacher for his See. He was to preach in place of the bishop. It was a happy choice, and Chrysostom was to fulfil the office with undreamed-of results. For twelve years thereafter he would be the spiritual guide for thousands.

No mention of Chrysostom's preaching would be complete without including the "incident of the statues," for it was this incident that endeared him to the hearts of the people by proving to them that their interests were paramount in all his thoughts and actions. Demonstrating against the imposition of new taxes, the townspeople defamed the statues of the Emperor and his family which stood in the public square. In reprisal the Emperor sent soldiers to discipline the rioters, many of whom were hanged just outside the town. The whole city was put under heavy guard and fear gripped the hearts of the people. In spite of his age—he was almost seventy-five—bishop Flavian, during the Lent of 386, set out for Constantinople to beg pardon for his flock. While he was gone, St. John preached incessantly. His discourses consoled those who had lost hope and at the same time worked for the reformation of the people, excoriating the current vices. He succeeded in turning the anger of the people to remorse culminating in vigorous penance. Pardon was their reward. Flavian's plea, inspired by Chrysostom, had brought tears to the eyes of the Emperor, Theodosius, and the whole city of Antioch rejoiced with St. John at the success that had crowned their works of penance. An unbreakable bond had been forged between the saint and his flock. He had suffered with them; consoled them in their misery; become one of them. To these simple, sincere people, St. John had become a symbol of their safety from spiritual as well as physical dangers.

As Bishop

In 398 St. John was smuggled out of Antioch to occupy the See of Constantinople as its bishop. This secret departure was necessary to avoid a storm of protest from the people who loved him so much. Although a stranger in his new surrounding, he was not a stranger to the way the Christian life should be lived. Immediately he initiated a more Christ-like mode of life in his new See. He organized charities for the alleviation of the poor and rebuked the rich for their extravagance. All his life he had disdained riches. Consequently the avarice of some of the Catholics in Constantinople enraged him. He became a popular figure with the destitute but was rejected by the wealthy, for wealth has a way of making itself respected in this world—as happened in the episcopal city of St. John.

In 401 Bishop Theophilus of Alexandria was accusing a group of Egyptian monks, known as the Great Brothers, of the Origenist heresy, one of the tenets of which was the pre-existence of souls. Chrysostom summoned Theophilus to Constantinople to defend charges which Chrysostom himself deemed false. Theophilus, joining the anti-Chrysostom faction in Constantinople, saw a chance to have the popular bishop deposed. He sent St. Epiphanius to Constantinople to press the charge of the same Origenist heresy against the holy bishop John. When the saint arrived and detected the plot, he wrote to Theophilus, "I leave the court, the town and the comedy; I am going away as quickly as I can." Smarting under the rebuke, the indignant Theophilus came to Constantinople himself and called a council of the adversaries of St. John. Theophilus was under the direct protection of the violent and changeable empress, Eudoxia, one of those whom John had only recently rebuked for extravagance. The famous, or rather infamous, Council of the Oaks succeeded in obtaining an order from the Emperor to have John exiled. This was done; but when the people discovered their bishop gone, a tumult ensued. After and earthquake, which to the eyes of many seemed a divine reprisal for the injustice, the Empress became panic-stricken and had Chrysostom recalled. Two months later John took occasion to correct the people for riotous conduct at the unveiling ceremony of the statue of the Empress. Eudoxia took this rebuke as a personal affront and had John exiled a second time. He was never to see his episcopal city again.

The last years of his life were spent in the outlying parts of the Eastern Empire. His popularity so lingered in Constantinople that his death seemed the only solution to his enemies, whose souls were lacerated by the thorns of jealousy. Cunningly they planned a long forced march for him to a new fortress in the far north of Asia Minor, hoping that the arduous journey would kill the aging bishop. Their calculations proved correct; in 407 the bishop succumbed to the cold and fatiguing travel in Comana, a city just south of the eastern end of the Black Sea.

A good account of his exile comes to us from his two hundred and forty letters. They are a light illuminating a saint. Heroic virtue shines through the lines of his letters, but no virtue more than gratitude. If ever a man had a cause for bitterness it was St. Chrysostom. He had suffered vicious injustice at the hands of those who should have been his friends, but he never complained; instead he constantly praised and thanked God for the blessings bestowed upon him, and even in exile showed the courageous resignation befitting a saint. He also showed great solicitude for his friends who had remained in Constantinople, and, his purpose in life being the direction of souls, he carried on this work by letter from the wilderness of his exile. There was no hidden resentment in his breast, only the burning love of God and of all His children.

His Importance

His value to the Church was as saint and preacher. He was not a deep, speculative thinker. Early in life he abandoned controversy with the heretics and concentrated upon the perfection of the faithful. His works fall into three groups: practical and monastic writings, sermons, and letters. The most important of the first type, and a source of inspiration to priests and bishops for centuries, is *The Priesthood.* Also important is his treatise on the monastic life. Neither of these theological treatises can be called speculative, but each is a work to incite devotion. His sermons, except for a few written on special occasions, after the "incident of the statues," all follow the same model: the first part is a simple explanation of the gospel story, and the latter a practical encouragement to a holy life. In his use of the New Testament he drew largely from the Gospels of St. Matthew and St. John, the Acts of the Apostles, and the Epistles of St. Paul. When using the Old Testament he drew chiefly from Genesis and the Psalms. Seven hundred of his homilies have been preserved. The appreciation of his letters awaits a sympathetic reader intent upon discovering the pure virtue of St. John.

Cardinal Newman gives us the key to an understanding of Chrysostom when he observes: "Great as was his gift of oratory, it was not by the fertility of his imagination or the splendor of his diction that he gained the surname of 'Mouth of Gold.' We shall be very wrong if we suppose that fine expressions, or rounded periods, or figures of speech were the credentials by which he claimed to be the first doctor of the East. His oratorical power was but the instrument by which he readily, gracefully, adequately, expressed—expressed without effort and with felicity—the keen feelings, the living ideas, the earnest practical lessons which he had to communicate to his hearers. He spoke because his head and his heart were brim full of things to speak about. His unrivalled charm, as that of every really eloquent man, lies in his singleness of purpose, and fixed grasp of his aim, his noble earnestness."[1]

His theological doctrine can be gleaned from his sermons. As is the case with other doctors of the Church, some point of his doctrine seems continually under attack. He is sometimes cited by Protestant scholars as having denied verbal confession, the sinlessness of Mary, and the primacy of Peter. Yet, despite endless discussion on all these points, it has never been shown that St. John positively held anything but the true doctrine of the Church. His undeniably positive position on the primacy of Peter has been established and soundly defended numerous times. His special glory is his devotion and eloquent words about the Holy Eucharist and the Mass. The Mass, the holy Sacrifice of the Cross, he regarded as the perfect prayer and sacrifice of his life.

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[1] *Historical Sketches* (London: Longman, Green & Co., 1917), vol. 2, p. 234.

As an orator and mover of the hearts of men he equalled, if he did not outshine, such great contemporaries as St. Augustine, St. Ambrose, St. Jerome, and St. Basil. It is almost universally conceded that he is the greatest vocal power in the Church during its post-apostolic history. History itself, his greatest witness, has faithfully proclaimed his fame for more than sixteen hundred years, and the Church Triumphant will proclaim his sanctity forever.

John Francis Jacobs, O.P.

LIGHT AND COLOR

"**AND GOD SAID:** Be light made. And light was made. And God saw the light that it was good; and he divided the light from the darkness."[1] This God did on the first day of creation, and from early man's very first glimpse of the light of day he began to wonder and speculate about its nature. Although scientific analysis of light began with Aristotle in the fourth century before Christ, its intimate secrets are still unknown even to the most recent of modern scientists.

The complexity of this natural mystery presents an almost insurmountable barrier to a clear and simple explanation of what is known regarding its essence and properties. Much time and energy have been expended by many of the foremost physicists in the past two hundred and fifty years in the investigation of the *measurable* aspects of this phenomenon. But this one-sided approach to a reality which is multi-faceted, this constant attempt to reduce nature to sets of differential equations, has obscured many essential truths. Now is the time—and after all, truth is never out of fashion—to reassert certain fundamental notions regarding the study of the sensible world in which we live and act.

A certain nowledge of reality is obtainable from common experience; from these observations general truths of the natural world can be derived. While it is true that as the subject matter becomes more particular, specialized research and methods are needed to uncover its innermost secrets, such discoveries, nevertheless, should not contradict the more universal truths of nature since these latter are valid for all material beings. The more detailed observations and experiments perform the function of refining our more general concepts as they apply to this or that particular case. With these points in mind, the following discussion proposes to present, as an introduction to an Aristotelian redintegration of physical data and theories, the salient facts and reasonings adduced by Aristotle and St. Thomas in their efforts to understand the nature of light. Note, however, that the allegiance of the modern scholastic philosopher or theologian to Thomism in no way commits him to the acceptance of those concepts of the ancient masters which subsequently have been proven false. On the other hand, an apparent conflict with modern knowledge does not *ipso facto* disprove the ancient history. Critical examination of all pertinent data must precede any judgment as to the truth or falsity of a particular concept or theory.

Analogical Use of Light

Even a cursory examination of philosophical and theological writings reveals a wide variety of ways in which the word "light" is employed. Obviously, the primary meaning and the most common usage of this word is with reference to corporeal vision. However, a secondary meaning is not excluded, namely: that by which something else is made known.[2] In its fullest scope the name "light" is predicated by analogy of proportionality, since the possible subjects extend from material to spiritual things and from the finite to the infinite.

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[1] Genesis 1:3-4.

Because human knowledge normally proceeds from the more known to the lesser known, and seeks and attains knowledge of invisible and intelligible realities through the visible and sensible, it follows that the more clearly we apprehend the nature of physical light, the richer will be our analogical concepts based on it. With our feet more securely planted on the solid ground of physical truths, we can the more safely explore the diaphanous, yet more substantial, regions of intellectual verities. As examples, note that among the many and varied uses of this concept in the natural order there are such expressions as: "the light of natural reason," "by the light of principles," and "the active intellect illuminates the phantasm." Instances in the supernatural order abound: "light of Faith," "light of glory," "God is light,"[3] "Light of Light,"[4] and "I am the light of the world."[5] These few quotations evince the range of possible applications, and at the same time indicate the importance of this study for the theologian. Throughout his theological works, St. Thomas has constant recourse to analogies based on the sensible phenomenon of light and color, and, as a consequence, the theologian must have a sure grasp of these concepts in order to interpret correctly these analogies.

There are several possible ways of expounding this subject. Probably the clearest way of presenting the essential notions involved is to commence with a statement of what general facts of observation were available to the keen eye of Aristotle. From these a number of conclusions can be readily derived comprising the foundation stones of his theory. Then, with these as a starting point, his arguments can be easily followed as he reasons to the truth that light is an accident, and as he finally arrives at its real definition. The remaining pages are an unfolding of this concise definition, during which process the notions of the diaphanum and of color and of their interrelations will be explained. A brief summary of the discussion and a few remarks concerning the direction that further study in this line should take, constitutes the conclusion.

Difficulties and Their Solution

Notwithstanding the importance and universal distribution of light, errors regarding its nature and properties have been abundant. The Greek Atomists and others considered that light was a body, subject to purely mechanical laws.[6] Others, at the opposite extreme, taught that it was something spiritual, either as a substance or as a spiritual form.[7] Another problem that was known even before the time of Aristotle and remains today, is the ever present difficulty of the relation of light to color: is color specifically distinct from light? If not, what is the relation of light to the *visibility* of color?

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[2] St. Thomas Aquinas, *Summa Theologiae,* I, q. 67, a. 1.

[3] I John 1:5.

[4] Nicene Creed.

[5] John 8:32.

For the modern physicist, the principal problem presented by light is concerned with its geometrical configuration: is it essentially a shower of particles (photons) or is it some type of wave? And if it is the latter what is the nature of the medium—if there be one? Common sense correctly demands that *something* be the substratum for a wave motion. But as the result of the Michelson-Morley experiment, designed to discover the hypothetically existing but yet *necessary* medium—for waves are the wave of something, an accident of some substance—experimental scientists without so much as a blush relegated the aether, as the medium was called, to the status of a medieval myth. A consideration of this difficulty, however, is postponed to a future paper, for which the present venture is a kind of preparation.

By the time the average person has attained adulthood, he has already observed many times over the various phenomena upon which Aristotle based his definition of light. In order to facilitate this analysis, for the moment remove or lay aside from your mind any knowledge you may have regarding the nature of light, whether it be from common experience or from scientific research.

Now imagine yourself on a summer afternoon to be standing on a hilltop overlooking a peaceful country scene. The first and most general impression is that you are seeing *something*, whether it be the foliage of trees, dandelion-covered fields, a herd of cows, or drifting clouds. Further, you note that these things are of various colors, shapes, and sizes. As the billowy, snow-white clouds hide momentarily the sun in their movement across the blue sky, the colors become less intense and the objects in the distance lose detail. After sunset there is a further and progressive decrease in the brilliance of colors and in sharpness of outline. Things in the distant background tend to blend one into another; blues, greens, and browns become more and more alike, until finally all that can be discerned are masses of black contrasted with various shades of grey. However, the loss of color in the landscape is compensated by the display which the sun splashes in glowing reds upon the canvas sky. The piercing, golden rays of the sun crown the horizon with a blazing halo as the fiery orb settles slowly into the deep, dark regions of space. All is quiet and dark. Heavy black clouds creep across the sky blanketing the few visible stars. And what can be seen? Nothing, nothing but Stygian darkness.

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[6] St. Thomas Aquinas, *Commentarium in Aristotelis Librum de Anima* (Turin: Marietti, 1936), II, lect. 14, n. 406.

[7] *Ibid.*, nos. 415-16. (Unless otherwise indicated all subsequent references to the *In De Anima* will be to book II, lect. 14.)

Suddenly, a firefly wings his way through the night air sending forth his mating signals—blinking specks of pale light. In the left foreground a campfire is started and in the yellow blaze a group of campers are plainly visible as they cook their evening meal. A little later a strong wind from the east, breaking and scattering the clouds, reveals a myriad stars as sharp, sparkling points of light against a black velvet background. Finally, a full moon rises over the water's edge and its light is reflected from the shimmering surface. The whole panoramic view seen that afternoon in a riot of colors is now seen in the pale moonlight as an eerie pattern of dark and light.

With this scene in mind, and with an occasional reference to other similar experiences, the following conclusions can be readily drawn:

1. Objects perceptible to vision are colored in some way, either extrinsically or intrinsically.
2. Some source of light is needed in order that the colored objects may be visible; for example, the sun, fire, etc.
3. Some visible objects do not need an extrinsic source of light to be seen; e.g., sun, stars, fireflies, etc.
4. Of these last things named, one—fireflies—have their own color by which they are seen in *daylight*, and their own light by which they are seen at *night.*
5. Colored objects are readily observed in light, but transparent bodies like air and water are not of themselves visible unless there are other factors present. For example, one can see with perfect clarity through twenty feet of clear, still water, but if there be dirt or motion then the water itself can be seen.
6. A ray of light is in itself not visible unless its presence is revealed by the illumination of an opaque body in its path. E.g., as the illumination of dust particles caught in a beam of sunlight entering a darkened room reveals its presence; or, as clouds and dust in the air reveal the rays of the setting sun.
7. Light can be reflected from a mirror or from a smooth surface such as is afforded by a body of water in such a manner so as to retain the form of the illuminating body more or less.
8. The effectiveness of light weakens with distance; the farther an object is removed from the source of light, e.g., a campfire at night, the less visible it becomes.

A fact which is often overlooked by modern thinkers when they criticize the natural science of Aristotle is that he was subject as much as anyone else to the conditions and the general state of knowledge of his time. No one today considers it a stain on Newton's escutcheon that he did not formulate the mass-energy equation, $E=mc^2$. Similarly, then, it should not be held to Aristotle's discredit that he did not anticipate all the present physical laws and theories in their mathematical form. It must be insisted, however, that although Aristotle based his conclusions on the limited available facts of his time, he did, nevertheless, express many truths of the physical world. A better understanding of his natural science could be had if a serious attempt was made to read his statements in the light of *his facts* rather than viewing them through the colored spectacles of present-day theories. Further, it is well to note here that Aristotle was concerned with color insofar as it specifies the faculty of vision, and with light to the extent that it cooperates in the seeing of color. This will help to explain the particular slant with which he approached the question.[8]

Light Not a Body

Light is a real being for it is something which we most certainly experience with one of our external senses — the sense of vision. And because it is something sensible, it is material and finite. Consequently, it can be placed in one of the ten categories of finite beings. Using a process of elimination by trying to place it in one or other of these classifications, we arrive at the notion of light as being in the predicament of quality. It is not a substance: certainly not a spiritual substance because light is something attainable by a sense faculty;[9] and it is not a material substance, i.e., a body, for three reasons.[10] If light were a body it would require that it occupy the place already filled by another body, namely, the diaphanous (transparent) body comprising the medium.[11] Secondly, since a body can move locally only by successive motion, light cannot be a body for it is seen to illuminate the transparent quality all at once and not part by part; this is evident from the instantaneous illumination of the whole celestial hemisphere from east to west at the moment the sun makes its appearance over the rim of the horizon. Because of the great distances involved, both Aristotle and St. Thomas state that any local motion should be detectable,[12] and since it is not, they must perforce conclude that the process is devoid of any time interval.[13] Further, when in common speech we refer to the motion of light or to its reflection, seemingly to imply similarity to a ball rebounding from a wall, we are merely using metaphor.[14] Finally, if light were a body, then whenever the source of light was removed or extinguished, the matter of the body constituting light would require a new form because prime matter can never be without a form. But there is absolutely no evidence of such corruption and generation taking place, unless one considers darkness to be a body — which is absurd. Hence, we must conclude that light is not a material substance.[15] Notice that Aristotle and St. Thomas are forced to this conclusion by the weight of available facts.

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[8] The principle references for the Aristotelian and Thomistic doctrine on this matter are the following: Aristotle, *De Anima,* Book II, chap. 7; *De Sensu et Sensato,* chap III; St. Thomas, the respective commentaries: *In de Anima,* II lect. 14, 15; *De Sensu et Sensato,* lect. 6, 7 & 8; *Summa Theologiae,* I, q. 67, aa. 1-3; II *Sent.,* dist. 13, q. 1, a. 3; John of St. Thomas, *Cursus Philosophicus Thomisticus,* IV pars, q. 7, aa. 1-2.

[9] *In De Anima,* nn. 415-16.

[10] *Summa Theol.,* I, q. 67, a. 2.

[11] *In De Anima,* n. 407. (To avoid possible confusion, note that the latin word *diaphanum* is rendered in this paper as: "transparent quality," "diaphanous quality," or "transparency," these being considered as synonymous.)

[12] However, St. Thomas in his commentary on *De Anima,* following a suggestive line in the latin text of Aristotle, seems to have had some doubt regarding this conclusion, for he says: ". . . this is an important question, as it were, difficult or entirely impossible." *Ibid.,* n. 412 (". . . hoc habet magnam quaestionem, tamquam difficile aut omnino impossibile.").

[13] Aristotle, *De Anima* (ed. Ross, *The Student's Oxford Aristotle;* New York: Oxford U. Press, 1942), II, ch. 7, 418bs4026; St. Thomas, *op. cit.,* nos. 409-412.

[14] *Ibid.,* n. 414.

Nor is light the substantial form of a body, particularly of the sun, for substantial forms are not *per se* visible but only *per accidens*,[16] insofar as their sensible accidents reveal their presence. Neither can it be a substantial form sharing the same prime matter with another substantial form, i.e., with the specifying form of the illuminated body, for the simple reason that two substantial forms cannot inform the same matter at the same time. Therefore in no way is light a substance.

Light a Quality

Not being a substance, light must then be an accident. But which of the nine? By a quick inspection of the various categories it can be readily seen that it is a quality. It is not quantity nor any of the other predicaments following upon quantity because *quantitas* (quantity) gives actual extension to the subject in which it inheres; *ubi* (where) is consequent upon a corporeal being occupying a place; *situs* (posture) places the parts in a definite relation to place. However, an illuminated body is not more or less extended than it was before it received light. Similarly for the other two categories, light does not influence their formal effects.

Light is not *relatio* (relation) because the latter is not observable by the sense faculty of sight. Neither can light be *actio* (action) or *passio* (passion, in the sense of suffering or undergoing some kind of change) for these refer to the very activity of an efficient cause upon a suitable subject. But the presence or absence of light does not prevent, in general, the efficient causality of a physical agent. That it is not *quando* (when) is clear because *quando* follows immediately upon time, whereas when half of the world is plunged in darkness — as it is constantly — that half is not placed outside of time, time is not suspended during that interval. And finally, *habitus* (covering, as clothes for man) does not include the notion of light, for the one covers, hides, whereas the other if anything, uncovers, reveals. Therefore, by elimination, *qualitas* (quality) is the only predicament that can contain light, for light fulfills the definition of quality: that which modifies the substance in itself to exist in this or that manner.

By positive argument, light is a quality because its presence yields a real and qualitative effect, such as, for example, the heating of bodies or the bleaching of cloth by the sun's rays; this fact also precludes the possibility that it is only an intentional quality.[17] There is another fact which lends support to this thesis; viz., that there is a real difference between the air in a totally dark room, and the same air when the room is filled with light. Note, however, that this is considering the air not formally as air but taken precisely as it possesses a quality — transparency — through which color can be seen when there is sufficient light present. In the dark, color is not visible; in the light, it is. Hence, the presence of light in the air (or in any other transparent medium) results in an obvious, sensible difference; and if the absence or presence of something results in a real difference, it must itself be real.

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[15] *Summa Theol., loc. cit.*

[16] *In De Anima*, n. 420; John of St. Thomas, *Cursus Philosophicus Thomisticus*, "Naturalis Philosophiae," (9th Ed., Reiser, editor; Taurini: Marietti, 1933), q. 7, a. 2, 206b17-26.

As a further refinement light can be restricted to the third species of quality — *qualitas patibilis* (sensory quality) — since it is a quality either *causing* a sensible alteration, or *caused by* a sensible alteration.[18] Now this is true of light in several ways; for example, light is known to fade colors, and the presence of light results in color being actually visible. Both of these are certainly cases of sensible alteration.

Inasmuch as the celestial bodies in the cosmography of Aristotle and St. Thomas held first place in the order of dignity among corporeal beings, it is fitting that light be considered as an active quality belonging most properly to these bodies, and especially to the first changing body, i.e., the first body that causes change, namely, the Empyrean heaven.[19] It should be recalled at this point that in the Aristotelian conception of the universe all motion in it was ultimately due to an extramundane and spiritual non-moved mover who acted through the outermost celestial sphere.[20] In this scheme light was an agency, a kind of instrumental cause, through which the celestial bodies acted upon the inferior bodies.[21] Such a notion is entirely in keeping with the general principle of St. Thomas that God directs the universe hierarchically, using the higher creatures to govern the lower.[22] Thus, it seems it is in this sense that light is predicated primarily and most properly of the first changing body.

General speaking, the English language provides only the one word "light" for which the Latin (and the Greek) employ two. *Lux* refers to light as it is in a self-luminous body such as the sun, while the term *lumen* is applied to its effect or participation by the transparent medium.[23] This latter word, *lumen*, is subdivided into *radius*, i.e., rays, if light proceeds in a straight line from the luminous body; and into *splendor*, which refers to the reflection of the light on a smooth or polished surface such as water or silver. The most important distinction to observe here is the difference between *lux* and *lumen,* for in some cases what applies to one is not true, or, at least not true in the same way, of the other, although this is merely an accidental difference due to the various ways in which light can exist. For example, St. Thomas writes that *lux* does not have a contrary,[24] whereas, *lumen* does have one, namely, darkness.[25]

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[17] *Summa Theol.*, I, q. 67, a. 3; John of St. Thomas, *loc. cit.*, 206b27-207b40.

[18] *In De Anima*, n. 420; Gredt, *Elementa Philos.* (Friburg: Herder & Co., 1937), I, sec. 188, 3.

[19] *In De Anima*, n. 421; *Summa Theol.* I, q. 5, a. 5 ad 5.

[20] St. Thomas, *Commentaria in Octo Libros Physicorum Aristotelis*, (ed. Leonina, Rome: Typ. Poly. Vat., 1934), VIII, lect. 9, 21.

[21] *Summa Theol.*, I, q. 67, a. 3 ad 3.

[22] *Ibid.*, I, q. 103, a. 7.

[23] II *Sent.*, dist. 13, q. 1, a. 3; *In De Anima*, *loc. cit.*

Before progressing any further with this discussion, it would aid considerably if the definition of light as given by Aristotle were simply stated: Light is the act of the transparent quality insofar as it is such.[26] The goal now being sighted renders the path thereto more intelligible. Recall, however, that although there are two words *lux* and *lumen* they refer to what is essentially the same reality, differing only in the manner in which light is existing, i.e., in the illuminating body or diffused in a medium.[27] Therefore, the definition of light can be applied to both *lux* and *lumen,* but proportionately — as will be seen.

St. Thomas in his *Summa Theologiae* gives another definition which applies more strictly to *lux:* "Light is the active quality following upon the substantial form of the sun, or of any other self-luminous body."[28] It is the first of these two definitions that primarily interests us here, though the second will not be entirely set aside. Furthermore, neither one can be understood without further explanation. For, as they are greatly condensed, each needs a gradual unfolding of its elements in order to bring out the richness contained therein . Hence, since the word transparent enters into the first definition, its meaning must be first clarified.

The Transparent Quality

Common observation leaves us in no doubt as to the existence of such transparent substances as air, water, glass, etc. However, the mere sensible experience of transparency is not sufficient for philosophical use. Consequently, this notion requires some purification before it can be of use in rendering the definition of light more clear. The transparent quality is not an accident consequent upon air, water or any other transparent body insofar as it is a particular *kind* of body. In addition, transparency is not limited to the corruptible bodies of our experience, but is found in some of the celestial bodies; for, as Aristotle reasoned, if the intermediate spheres in which the planets were embedded were not themselves transparent, the fixed stars contained in the eighth sphere would not be visible. Therefore, the transparent quality is a common nature found in many bodies but shared by them in varying degrees.[29]

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[24] *In De Anima,* n. 421.

[25] *Ibid.,* n. 408.

[26] Cf. *De Anima,* II, ch. 7, 418b8-9, 419a12; also, *In De Anima,* n. 405.

[27] John of St. Th., *op. cit.,* q. 7, a. 2, 206a34-38.

[28] ". . . lux est qualitas activa consequens formam substantialem solis, vel cuiuscumque alterius corporis a se lucentis . . ." (I, q. 67, a. 3).

[29] *In De Anima,* n. 404; St. Thomas, *Comment. in De Sensu et Sensato* (Rome: Marietti, 1949), lect. 6, n. 82.

From the very composition of the word "transparent" its meaning is obvious: to appear through, i.e., something can be seen through it. The same is true of the Greek word "diaphanos." But unless there is light, *lumen,* a body possessing this diaphanous quality is *not actually* transparent, because nothing is visible through it. Hence, the transparent is in act only when it is being illuminated.[30] Note, however, that the transparent quality in itself is in potency to light or to its privation — darkness. And because light is the act and the form of the transparent quality it can be called the color of the latter, analogous to color as it is an act and form of an opaque body. Notwithstanding such analogous usage of the word "color," Aristotle calls the transparent "visible" not because it itself is visible, but inasmuch as through it the color of an object is visible.[31] It can be denominated visible also for the reason that opposites are known by the same potency, and hence it would be perceivable by sight in the same manner that darkness is.[32]

In addition, when the diaphanous quality is not actually being illuminated, it is always in the ultimate dispostion to receive light, because light precisely as such does not have a *positive* contrary—merely a privation. Accordingly, there is no previous accidental form to be replaced by that of light. It is for this reason that Aristotle and St. Thomas conclude that illumination is instantaneous, since there is no intermediate state between not having a particular form and having it.[33]

This diaphanous quality can be considered as existing in three degrees and ways. In the first degree, the whole of it is reduced, as it were, to perfect act so that it is not able to receive any further quality in the genus of light; among the self-luminous bodies, which so possess the transparent quality, this belongs to the sun most properly. It also pertains to a lesser extent to fire and least of all to those phosphorescent materials whose light because of weakness can only be seen in the dark. Those bodies having the diaphanous quality in the second degree are characterized as having the capacity to receive light throughout their extension but do not of themselves have light in act. It is to such bodies as the celestial spheres (excluding the stars which hide anything behind them), air, water, etc. that the word "transparency" is most correctly applied. And the third degree of receptivity of light is found in the opaque substances which cannot receive light throughout the body but only at the surface; although, if such a physical being were cut, the newly exposed surface would be in the position to receive light and therefore would be seen as colored, indicating that the transparent quality was diffused in the entire body, not in act but in potency.[34]

It is important to realize that these three degrees of the transparent quality do not merely represent a difference of intensity, or of a gradual variation on the same plane. These differences have a deeper significance; they indicate the *various ways* in which light can be shared by material substances. Self-luminous bodies are diaphanous insofar as they permit the quality of light which they possess by their own right to permeate the entire body. Air and water are most properly called diaphanous because when they are illuminated — they only *share* in light and do not have it in a stable manner — colored objects can be seen through them by virtue of this diaphanous quality. And opaque objects also have this quality but in an inferior manner since they are not, strictly speaking, transparent, i.e., as long as they are opaque. But they are receptors of light, yet only at the surface. The implications of this will be examined in a later section.

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[30] *In De Anima,* n. 405.

[31] *De Anima,* II, ch. 7, 418b5-7.

[32] *In De Anima,* II, lect. 15, n. 428.

[33] *Ibid.,* lect. 14, n. 425.

[34] *In De Sensu et Sensato,* lect. 6, nos. 84-86.

If we examine the four elements of Aristotelian chemistry, it is quite apparent that these provide a basis for the distribution of bodies into three classes: a) those bodies which are self-luminous, b) those which are transparent, and c) those which are opaque. *Fire,* as the element, has light by its nature; hence, any being possessing this element will shine of itself unless there is too great a proportion of the opaque element — *earth.* The other two elements, *air* and *water,* are transparent, i.e., they contain the diaphanous quality in the second degree as explained above.[35] Hence, whether a body gives off its own light or is transparent or opaque is determined by what elements are present and in what proportion. It may be interesting to note in passing that a possible foundation for the doctrine of the four elements was the *observation* that when a natural physical substance was burned, e.g., wood, four things were observed: *fire* in the form of flames proceeded from it; gases (*air,* for them, i.e., for Aristotle and his contemporaries) were seen to escape; moisture (*water*) could be collected on the surface of a cold piece of metal held near the flames; and ashes (*earth,* for them) remained after the reaction was completed.

Color

Up to this point, a common sense notion of color was assumed in the discussion of light and the transparent quality. Now, attention will be focused on color in order to complete the preliminary explanations leading to a unified presentation of this triad: light, color, and the transparent quality. All three concepts are so closely intertwined that no one of them can be fully understood without the other two. On the other hand, it is not possible to start a discussion about all three at the same time. Hence, it is necessary to consider first each one separately in order to acquire some general notions of each, and then to study their intimate interrelationships.

Color is the proper object of sight, for it is that which vision first and directly attains. But visibility is attributed to color not in the sense that it is of the very essence of color, for in that case color would not be in the need of light to be actually seen; in total darkness colored objects would be clearly visible, which is certainly contrary to experience. Still, color is said to be visible because it has within itself the cause of its visibility so that when sufficient light is present, it is visible by virtue of this property.[36]

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[35] *In De Anima,* n. 422.

Aristotle has given us two definitions of color: "Color is the limit of the translucent (i.e., the transparent) in a determinately bounded body";[37] and "color has in it the power to set in movement what is actually transparent."[38] According to John of St. Thomas, the first definition refers to the very nature of color; the second, an expression of its property.[39] However, the definitions as they stand, like all of the succinct definitions formulated by that Greek philosopher, need explanation.

In the first definition that Aristotle gives of color, he specifies that the body must be determined, by which he means that it be limited by definite and fixed boundaries intrinsic to it. He derived this conclusion from the observation that it was only such bodies that had a fixed color; and that bodies like the ocean, whose limits were only extrinsically determined, and then only more or less so, did not possess any permanent and definite color, because a change of position on the part of the observer, or the weather, would yield a different color. The problem presented by colored liquids such as those of Aristotle's experience, e.g., blood, wine, dyes, etc., can be answered when it is remembered that their color was really due to the suspension or solution of colored solids in water.

That the color which such indeterminately bounded bodies possess is due to exterior causes is apparent in the glorious displays of the rising or setting sun. The variety and ever changing pattern of colors are due to the different angles at which the light strikes the clouds. The blend of many factors accounts for the apparent color of oceans and other large bodies of water: the condition of the sky — clear or cloudy; whether the the lake or ocean bottom is sandy or covered with marine vegetation; whether there is silt suspended in the water and the particular position from which an observer is viewing the scene.[40]

In addition, color itself is not the limiting term of a body, for that function belongs properly to the surface as such. But it is the limit of the transparent, i.e., of the diaphanous quality taken precisely under that aspect. For, color is the limit of the transparent quality in a *colored body;* it is *not* the limit of the body as it is quantitative, but as it is qualitative, i.e., insofar as it possess transparency. To the extent that a thing is colored, to that degree is it opaque. Hence, the limit of the transparent quality would be that particular quality capable of terminating its transparency; this is accomplished by color.

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[36] *Ibid.*, n. 402.

[37] *De Sensu et Sensato,* ch. II, 439b11. The latin text as found in the commentary of St. Thomas reads: as "Quare color utique erit perspicui extremitas in determinato corpore." In context, "transparent" is a better translation than "translucent" for the word "perspicuum."

[38] *De Anima,* II, ch. 7, 418a31; "Omnis enim color motivus est ejus quod secundum actum est diaphani . . ."

[39] *Op. cit.*, q. 7, a. 1 198b5-20.

[40] *In De Sensu et Sensato,* lect. 6, nos. 90-1.

Recall that in opaque bodies the transparent quality is receptive of light only at the physical surface of the body. Then, since color is a participation of light through the mediation of the transparent quality, color must be actual only at the surface of a body.[41] Insofar as color is color, it is not itself transparent, for it is *per se* visible. Consequently, color must be the limit of transparency *in the colored body,* and not of the transparent quality as it is in the surrounding medium.

Color Moves the Transparent Quality

The second definition indicates that color is able to set transparency into motion, providing that the latter is already in act; this motion is the reception by the medium of an intentional similitude or species of color. It is called "intentional" because the species of color in the transparent quality does not color the medium; the air between colored objects and the eye is not colored by its role of medium. In other words, the species do not produce perceptible effect in the medium.[42] Yet color must be in the medium in some manner for, since we perceive it to be in external objects, it must somehow have reached our organ of vision. Hence, it follows that color must be in the medium, but not at it is in the colored object nor as it is in the eye. Therefore, this presence, representation, species of color is said to be there intentionally. But, the word "intentional" here does not mean representative like the intentional existence a form has in the mind, but that the species are present in a transient and dependent manner unlike the way color inheres in a colored body.[43]

What the eye sees is color, but, although color is *per se* visible, it is not able to set the transparent quality in motion unless it is first placed in act by light. This is why light (*lux*) is said to be essentially visible, precisely insofar as by its very essence it is the reason — really a *conditio sine qua non* — for the visibility of color.[44] "It is true that color is seen by means of light because it renders color to be actually visible."[45]

There are, however, certain bodies such as the firefly and some kinds of decaying matter which are phosphorescent that can be seen at night by their own light, although during the day are seen as colored objects, apparently not emitting any light and requiring an external light to be visible. Because their own light is too weak to reduce perfectly the transparent quality in act, their color is not able to move the diaphanous quality, and consequently they cannot be seen *as colored* at night. Nevertheless, their phosphorescence is visible but only to the extent that it is able to render the transparent quality actually transparent.[46]

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[41] *Ibid.*, nn. 87-9.

[42] John of St. Th., *op cit.,* q. 7, a. 2, 209b29-219a7.

[43] *Ibid.*, 212a23-41.

[44] *Ibid.*, 207a12-40.

[45] ". . . sed verum est quod per lucem videtur color, quia facit colorem esse visibilem in actu." (II *Sent.*, dist. 13, q. 1, a. 3.)

[46] *In De Anima,* nos. 429-30.

Because color has some kind of dependency on light for its actual visibility, some have held that color was not at all visible of itself. Although some texts from St. Thomas might seem to lend support to this position, John of St. Thomas most emphatically states that this is not the case.[47] Color intrinsically has the power to be seen, but it can only move the medium if the diaphanous quality is already in act; and this act is brought about by light (lumen).

Favorable to this explanation is the fact that a colored object pressed against the eyes is not seen, because, even though the cornea and intraocular fluid are transparent, they are only in a potentially transparent state so long as light does not reduce their diaphanous quality to act. Obviously, such an object blocks off any entrance of light into the eye through the pupil. Consequently, since color can move the transparent quality only if it is in act, any colored object in the stated position will not be seen — at least, precisely as colored.[48]

Medium Required

From this observation Aristotle and St. Thomas conclude that a medium between the colored object and the organ of sight is required. So necessarily, it must be said that sight would be impossible in an absolute vacuum, understanding this term to mean the total and absolute absence of any material being whatsoever. The reason is simple: since the sense of sight (and similarly all the other external sense faculties)[49] is not affected by direct contact with its proper object — color — it must then be moved by an intermediate capable of accomplishing this. The transparent quality fulfills this condition; and by definition, it is totally absent from an absolute vacuum.[50] Hence, this distinction can be made; light moves or actuates the organ of sight in a non-determined way; color, on the other hand, moves sight *in such a manner,* in a determined way. By light, the eye sees by color, it sees something, a color, a colored object.[51]

It might be concluded from these explanations that light and color are completely disparate entities. Yet, there are passages in the writings of St. Thomas that suggest a more intimate relationship between these two. For example, he states in *In De Anima* that "color is nothing else but a kind of light obscured in some manner by the admixture of an opaque body."[52] This is a summary statement of his reasoning based on the distinction between a perfect and imperfect power. Now a form, insofar as it is such, acts to produce something similar to itself. But a form with perfect power not only has the strength to produce its similitude in that which is capable of receiving it — for this an imperfect power can do — but it can also *dispose,* prepare, the potential subject to the reception of its likeness. Pure light has this perfect power, whereas color has only an imperfect power, needing light to dispose the receptive medium, i.e., to render it in act.[53]

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[47] *Op. cit.,* q. 7, a. 2, 208b28-43.

[48] St. Thomas, *op cit.,* lect. 15, n. 432.

[49] *Ibid.,* n. 437.

[50] *Ibid.,* nos. 433-35.

[51] John of St. Th., *op cit.,* q. 7, a. 2, 214b10-26.

[52] ". . . color nihil aliud est quam lux quaedam quodammodo obscurata ex admixtione corporis opaci." (II, lect. 14, nos. 425-6.)

In *De Sensu et Sensato* St. Thomas says that "the principle of color is two-fold: one indeed is formal, namely, light; the other, material, namely, the transparent."[54] John of St. Thomas, proceeding rather cautiously, points out that light and color are nevertheless distinct. "Color," he writes, "participates in light mediately, namely, through the mediation of the diaphanous quality which is receptive of light, and which, when mixed with opaque matter, produces colors."[55] He immediately adds that this participation is not a share in the same species, but is, as it were, derived from it.[56]

One gathers from these carefully phrased expressions that, though recognizing the intimate connection between color and light, St. Thomas and his commentator were at a loss as to what the precise relation was in reality. A clarification would only be forthcoming when more information was obtained through the detailed observations provided by experiment. In this wise, the necessity and utility of special techniques in the investigation of nature become more apparent. Aristotle provided much of the substantial framework, and left to his successors the task of furnishing the vast amount of quantitative data required to perfect the structure of natural science.

Origin of Colors

The last question to be considered here is concerned with the distinction and origin of the different colors: are they specifically distinct? How are they constituted? Aristotle considered black and white to be colors. In fact, they are contraries, the extremes of his spectrum between which lies the continuum of the different colors. But because a continuum is divisible into an *infinite* number of *unequal* parts (i.e., proportional parts) while being divisible into a *finite* number of equal parts (*aliquot* parts), the number of intermediate colors between black and white is finite.[57] This follows from the principle which Aristotle proves in the first Book of the Posterior Analytics,[58] "that in all classes of things lying between extremes the intermediates must be limited."[59]

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[53] *Ibid.*

[54] "Est autem *duplex* coloris principium: *unum* quidem formale, scilicet lumen; *aliud* materiale, scilicet perspicuum." (lect. 6, n. 80.)

[55] ". . . colores esse participationem lucis mediante perspicuo, quod est susceptivum-lucis, quod mixtum opacitati facit colores." (*Op. cit.,* q. 7, a. 2, 214a18-22.)

[56] *Ibid., 214a22-32.*

[57] Aristotle, *De Sensu et Sensato,* chap. 6, 445b26-29; St. Thomas, *In De Sensu et Sensato,* lect. 15, n. 216.

[58] Chap. 20-1.

[59] Aristotle, *De Sensu et Sensato,* chap. 6, 445b22-23; St. Thomas, *In De Sensu et Sensato,* lect. 15, n. 215.

The extremes, black and white, arise in this manner: white is the maximum participation of light by the transparent quality of an opaque body, while black represents the minimum, although not to the point of being a pure absence of light, for then it would not be in the same genus as white and hence not a color. The remaining colors are the intermediate degrees in the participation of light.[60]

In casting about for an explanation of the distinction and manner in which the different colors are formed, Aristotle rejects several possibilities, and arrives ultimately at this conclusion: they are formed by the intimate intermingling of black and white so that every part of the compound, no matter how small a part is taken, contains the same proportion of black and white as the whole. Consequently, regardless of the distance from which one examines a colored body, it will show the same color uniformly, which would not be the case if it were merely the juxtaposition or superimposition of small black and white particles.[61] (An example of the mere mixture of particles is the result obtained from mixing salt and powdered carbon or iron filings.) In other words, colors other than white are deficient in the perfection of white in varying degrees, black representing the maximum. This deficiency is determined by the proportion of opaque matter and the diaphanum making up each particular body. Hence, ultimately, the different colors are due to the precise degree that light is participated by the transparent quality of an opaque body. This notion is important because in a subsequent paper it will be shown that it is a link between the Aristotelian and modern concepts of light and color.

This limited study has yielded suggestive insights which indicate that the divergence between Aristotle and Einstein — using these names as symbols of modes of investigation — is not so great as was thought on first sight. The next step will be to examine the data obtained from the refined observations and experiments of the modern physicist in the perspective of Aristotle's concept of light. It will be very important at this stage to separate carefully the *facts* from any overlay of philosophical prejudices introduced by the experimenter or by scientific theorists. Such a procedure will permit a minute examination of the phenomenon of light and at the same time will insure a balanced view of nature, with the parts properly related to the whole and to one another. Then, if the attempt at redintegration proves to be successful in this limited application, it will have provided a possible course for future investigations on a broader and more significant scale.

Albert Moraczewski, O.P.

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[60] St. Thomas, *ibid.*, lect. 7, n. 95.

[61] *Ibid*, lect. 8, nn. 113-16; Aristotle, *De Sensu et Sensato,* chap. 3, 440b1-25.

RATIONAL RECREATION

IN A COUNTRY such as ours, where sports have become a profession for some and a time consuming occupation for many, the individual who fails to engage in some kind of bodily recreation is looked upon as eccentric. Sports-for-all is a national slogan and it has been adopted by enthusiasts in all walks of life. Educators feel that their school is not a success unless it boasts a large football stadium and a winning team to draw capacity crowds every Saturday in the fall. Child psychologists name sports as a "sure-fire" cure for the growing social evil of juvenile delinquency. Labor unions demand shorter hours so that their members may have more time to relax and recreate. In short, Americans probably recreate as much as, if not more than, any people since the ancient Romans.

Must we conclude that this emphasis on recreation is totally wrong? Sports are beneficial to both body and soul, and diversion from the cares of everyday life is necessary, to some extent, for everyone. However, in sports and recreation, as in all human actions, we can step beyond the bounds of reason and thus sin against the virtue that governs these actions.

To say that we govern by a virtue those words and actions through which we recreate seems to be contradictory, since virtue is usually associated with things serious and difficult, while for most people recreation is definitely not of this nature. Moreover, everyone likes to recreate; we have a natural inclination to do so. No golf addict has to be persuaded to shoulder his clubs and head for the nearest golf links, nor does any young lad willingly stay at his piano lessons when he could be out playing ball.

The very fact, however, that we have such inclinations to recreate, guarantees us that there is a virtue concerning this action, for a natural inclination is the begining of virtue. Subjection of this inclination to control by reason results in perfect virtue. St. Thomas expresses the same thought in this manner:

> The natural inclination to a good of virtue is a kind of beginning of virtue, but is not perfect virtue. For the stronger this inclination is, the more perilous may it prove to be, unless it be accompanied by right reason, which rectifies the choice of fitting means towards the due end. Thus if a running horse be blind, the faster it runs the more heavily will it fall, and the more grievously will it be hurt. And consquently, although moral virtue be not right reason, as Socrates held, yet not only is it according to right reason, in so far as it inclines man to that which is according to right reason, as the Platonists maintained; but also it needs to be joined with right reason, as Aristotle declares.[1]

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[1] *Summa Theologiae* (English Dominican Fathers' Translation; New York: Benziger, 1947), I-II, q. 58, a. 4 ad 3. All further references to the *Summa* will be from this edition.

The establishment of a natural desire for recreation, however, does not necessarily mean that there is a virtue of recreation, because the matter of recreation, namely, games and humor, may be the matter of some virtue. This seems to be the case in such strenuous sports as football and hockey in which the players are prompted to strive for victory by the virtue of fortitude. It also seems to be the case in any game in which the victor might become proud, for then the virtue of humility would be called upon to make him realize his true worth.

In order to establish recreation as a distinct virtue, therefore, it is not enough to say that we have a natural desire to recreate, but we must also say that the matter of recreation is not governed by any other virtue. This is because the games and jokes of recreation are sought for their own sake, that is, for the pleasure they will bring. Since these games are not played primarily for the victory or because of pride, they will not require acts of the virtues of fortitude or humility.

Granted the existence of such a virtue as recreation, we would do well to learn more about it in order to practice it more fruitfully in our daily lives. It is our purpose here to accomplish such a work, that is, a short exposition of the nature and kinds of virtuous recreation according to the doctrine of St. Thomas. We will draw few particular conclusions, but we hope to establish and clarify a few norms and principles.

Its Name and Necessity

Precisely what does the word recreation mean? The Greeks had a word for it, as they did for almost everything. They combined the words "well" and "turning" and arrived at the word *eutrapelia.* For Aristotle this signified the wittiness or pleasantness that was caused by humorous words or actions.[2] St. Thomas used *ludus* to signify *eutrapelia,*[3] and used it in almost the same way as did Aristotle. Hence for St. Thomas *ludus* meant pleasure drawn from both words and actions. Note that the primary connotation that both St. Thomas and Aristotle give to these words has to do with pleasure caused by words rather than actions. They appear to stress jokes more than games as the matter of recreation. There is a reason for this, as will be shown in the discussion of the matter of the virtue.

The English equivalent of *eutrapelia* is *recreation.* Webster defines this as "a refreshment of strength or spirit after toil." This corresponds very well to Aristotle's and St. Thomas' "well or pleasing turn of mind" that results from pleasant or amusing words and actions. For if the mind turns to diverting thoughts, it must have been previously concerned with serious thoughts.

The idea possessed by the hypothetical average man about recreation would also agree with Webster's definition. While he may use different words to express it, he would certainly agree that no one can rest or relax continually, and he would also agree that relaxation is most beneficial and necessary after laborious mental or physical endeavor.

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[2] *Nicomachean Ethics* (ed. McKeon, *The Basic Works of Aristotle;* New York: Randon House, 1941), II, ch. 7, 110a 12-15.

[3] *In Ethica Nich.* (Turin: Marietti, 1949), lib. II, ch. 7, lec. 9.

At first glance, it seems strange to say that there is a need for a virtue to control recreation. Instead, the time and money spent on it, as well as other circumstances concerning it, are usually themselves controlled by a man's occupation; for instance, one who works in a printing plant all day could hardly play golf every afternoon; nor would one in modest circumstances be able to go deep-sea fishing three months of the year in the Gulf of Mexico.

Upon closer examination, however, it becomes evident that there are many ways by which desire for diversion can become master of our activities and thus cause us to sin. As in all things subject to reason, sin may arise from an excess or defect. St. Thomas lists three ways in which recreation can be violated in this manner.[4]

The first states that the nature of the act itself might be sinful. This would be the case if one should use obscene words or actions for the purpose of entertainment. Such words or actions might also be directed toward our neighbor, and then charity and justice as well as recreation would be violated.

An excess of diversion may also arise from lack of due circumstances. In this case, the act itself would be good but it would be sinful if it were done at an unfitting time or place, or if it would give scandal to persons viewing it. If a man were to play baseball every Sunday morning and, as a result, miss hearing Mass, he would surely not fulfill the circumstances of proper time; for the pleasure he derived from the ball game would cause him to disobey one of the Church's commandments. The act itself, playing ball, would be good. However, the fact that it was done at an improper time, resulting in a sin against the virtue of religion, would make it a wrong action. A man with a large family to support would also sin against this virtue if for the purpose of play he should neglect his work and thus cause undue hardship to his family.

The third way of sinning against recreation is by defect. As St. Thomas affirms,

> It is against reason for a man to be burdensome to others, by offering no pleasure to them, and by hindering their enjoyment . . . Now a man who is without mirth, not only is lacking in playful speech, but is also burdensome to others, since he is deaf to the moderate mirth of others. Consequently, they are vicious, and are said to be boorish or rude, as the Philosopher states.[5]

These are strong words indeed; however, to this he adds,

> Since mirth is useful for the sake of the rest and pleasure it affords; and since in human life, pleasure and rest are not in quest for their own sake but for the sake of operation . . . it follows that lack of mirth is less sinful than excess thereof.[6]

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[4] *Summa Theol.*, II-II, q. 168, a. 3.

[5] *Ibid*, II-II, q. 168, a. 4 c.

[6] *Ibid.*

The Definition

Having seen the necessity of recreation it now remains to consider its nature. The nature of a thing is best expressed by its real definition, and to find this the material object and the formal object must both be considered, for together they form this real definition. This simply means that to find out what recreation is we must first determine what it is concerned with and why.

The material object, or matter, with which recreation is concerned, is that which gives delight to the passions and in so doing gives rest and pleasure to the soul. Since this object includes a great many things, it is best to consider it under two aspects, namely, from the aspect of that which is serious in itself.

The joke is considered under the first division because of its very nature it is the direct opposite of the serious. That is why both Aristotle and St. Thomas give it the first place when speaking about recreation. Included here are wit and humor, whether spoken or written; also included is pantomime, which brings about a happy turn of mind by humorous actions and, in so doing, fulfills the aim of recreation.

The second, or serious, aspect considers games of all kinds; for the object of most games, such as chess, checkers, baseball or football, is victory, and victory usually cannot be gained in such games unless the participant applies himself in a serious manner. From the fact that most games are serious in themselves, a difficulty arises. It is not easy to see how something serious in itself may be able to cause relaxation. For example, chess would appeal to few people as a means of amusement; to others, the playing of a spirited game of football or baseball would appear more obnoxious than a day spent working at the office.

However, it must be remembered that in recreation we seek relaxation of the soul through pleasure, and if this pleasure is obtained by valid means the aim of recreation is fulfilled. We must also call to mind that the particular purpose of any game is different from and secondary to the general and primary purpose of recreation itself. For example, the purpose of a baseball game is to score a greater number of runs than the other team, yet the reason baseball is played, as a game, is recreation. The two purposes can be reconciled only if it is realized that the end of baseball, that is, scoring more runs, is subordinated to the end of recreation, that is, giving pleasure to the passions and thereby relaxing the soul.

This does not mean that baseball, or any other game, defeats the purpose of recreation if all participants try to win. For the irascible appetite seeks the victory, and the attainment of this end will quiet the upsurge of this appetite. More important still in the consideration of this particular virtue is the concupiscible appetite, which will also attain its proper end of delight or pleasure in the winning of a game. St. Thomas remarks:

> It is naturally pleasant to overcome (win) inasmuch as it makes a man appreciate his own superiority. Wherefore all those games in which

> there is a striving for the mastery and a possibility of winning it, afford the greatest pleasure: and speaking generally all contests in so far as they admit hope of victory.[7]

However, the need for subordination of the end of the game to the end of recreation requires that unless there is such subordination, at least implicitly, baseball or football or any other game ceases to be recreation in the true sense of the word. If the primary end of the game ceases to be pleasant relaxation and is replaced by moneymaking, or some other end, then the playing of the game is not an exercise of the virtue of recreation. The best examples of this phenomena can be found in professional sports, and also in the athletic teams sponsored by some of the larger American colleges and universities.

This does not result in wholesale condemnation of all professional and college sports, however. The players on professional ball teams as well as the owners of such teams do not profess to be interested in providing recreation for themselves, but rather for the spectators. That they do provide such recreation is a fact attested by the millions of persons who flock to ball parks and arenas during each year to find relaxation and amusement.

The case of the large colleges and universities is somewhat harder to judge, since the players on a large percentage of such teams are professional in fact, if not in name. It is truly difficult to ascertain whether the primary purpose of the teams fielded by such schools is to provide recreation for the students, revenue for the school treasury, or a national reputation in which the faculty, students and alumni can glory. The answer to this question, however, is outside the scope of this article.

To establish more firmly the fact that serious objects may be the matter of recreation, it must be remembered that these serious things also fulfill recreation's aims insofar as they relax the soul. They accomplish this by limiting the activity of the intellect to thoughts concerning the application of means to the attainment of the particular end of the game. Since these means are usually close at hand and their correct application is already determined by the rules of the game, the intellect will be freed from the duty of laborious reasoning and the proper balance between work and rest will once again exist in the soul.

Hence, if victory is attained, and this is the end of any serious game, it will given pleasure to the victor. The contestant who loses will also receive some delight from the mediate victories that are gained in the course of the game, such as the scoring or runs or points. Both contestants will also receive some pleasure from the hope of victory, for there is joy even in the hope that a good might be attained.[8] In addition to the objects of recreation mentioned above, there are also such things as parties, picnics, and vacations, but these, rather than being matter of diversion in themselves, are only conditions that promote diversion.

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[7] *Ibid.*, I-II, q. 32, a. 6 ad 3.

[8] *Ibid.*, I-II, q. 2, a. 4.

The formal object or motive of a virtue is found in the answer to two questions: what particular good does reason see will result from the practice of this virtue; and — since every virtue moderates something — precisely what does recreation moderate?

Since the thing we gain immediately in recreation is pleasure, pleasure is the thing that will be moderated. The practice of this virtue will insure that pleasure will be gained neither through acts sinful in themselves, nor through acts which are performed at improper times or in undue circumstances. It will also insure that its possessor will obtain sufficient recreation. In short, through recreation a man seeks pleasure according to reason; he fits it into his daily life so that it will not become his master and cause him to neglect his main purpose in life, that of attaining heaven.

The good that reason expects to gain from this virtue can be expressed as refreshment or relaxation of the soul. This relaxation is fully as important as bodily relaxation, for just as the body cannot do without food and rest for any appreciable length of time, neither can the soul do without pleasure gained from recreation, for pleasure is to the soul as food and rest to the body.

Having found the material and formal objects we can now define recreation in this wise: it is a virtue which enables man to moderate the pleasure that he gains from words and actions which are sought in order to relax and refresh the soul.

The Subject

To find the subject or faculty from which the acts of recreation proceed, the formal object must be considered more closely, for the formal object of an act is also the formal object of the faculty which produces the act.[9] The formal object of the act of seeing, for example, is always some particular color, and since the act of seeing proceeds from the eye, the formal object of the eye is color. Hence, the faculty concerned with the formal object will be the subject of recreation. Since the immediate aim of recreation is to moderate the delight that may arise from diversion, the virtue of recreation will be found in that faculty which, when subjected to reason, moderates the desire and pleasure of the senses. In other words, recreation is found in the concupiscible appetite because it is this faculty which inclines us to pleasure and also moderates pleasure when subjected to reason.

However, subjecting the virtue in this appetite presents a problem. Since a good of the soul is sought, namely, relaxation of the intellect and will, it would seem more likely that recreation should be in the will, because the intellect must be moved to seek its object by the will.

In the solution of this problem it must be remembered that the soul is a spiritual substance and, although it was created to inform a material body, yet matter does not enter into the composition of the soul itself. Hence, the faculties of the soul, the intellect and will, are also spiritual and are not subject to material fatigue and deterioration. On the other hand, the faculties that demand relaxation are those sense faculties, such as the common sense and sense memory, which minister to the intellect and which are periodically in need of relaxation and restoration since they are conjoined to matter. Thus, only in an analogous way can the soul be called tired. Yet since our spiritual faculties can only attain their objects through the internal sense faculties it often appears that when these sense faculties are tired the soul itself is tired. Fatigue of the common sense, for instance, results in a less clear phantasm and, consequently, a less clear concept of the thing known.

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[9] *Ibid.*, II-II, q. 162, a. 3.

The settlement of this problem gives rise to another. A mover must be found for the intellect, that is, the intellect must be moved by some faculty other than itself from serious to diverting thoughts. If this mover or cause is the concupiscible appetite the order of virtuous action is destroyed, because the lower faculty would then be the mover of the higher one. This would reverse the natural and correct process by which the higher faculty should rule and direct the lower. The principle for a solution is found in St. Thomas:

> Some virtues are directed to the good of moderated passion, which is the proper good of this or that man; and in these cases there is no need for virtue in the will, for the nature of the power suffices for the purpose.[10]

The intellect, in other words, will be moved from serious thought by the will and not by the lower appetite. The reason is that since the pleasure sought in recreation is a proper or connatural good, the will by its natural appetite moves the reasoning power to diverting and amusing thoughts. It is only when seeking a good not proportioned to its own subject that the will needs virtue, as for example, in seeking the good of one's neighbor.

In this light, then, keeping in mind the cooperation between the will and the lower appetites, recreation is said to be subjected in the concupiscible appetite.

Act of the Virtue

Since it is the duty of virtue to direct our acts in the path of right reason, one of its acts avoids the pitfall of excess, the other avoids the sin of defect. In the matter of all virtues, however, we are naturally more prone to sin either by excess or defect. For this reason, every virtue has a primary and a secondary act; the primary act is to correct that vice to which we are more naturally drawn, be it to excess or defect, while the secondary act guards against that vice to which most men are naturally less attracted.

In the virtue of humility, for instance, the primary act is to minimize any inflated opinion of ourselves, since most men are prone to overestimate themselves or forget that everything they have is from

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[10] *Ibid.*, I-II, q. 56, a. 6 ad 3.

God. In some few men, however, the tendency is to underrate themselves and not to realize the talents that they actually possess. As a corrective to such an attitude, the secondary act of humility furnishes these persons with a better opinion of themselves by helping them to realize their true dignity and worth. Therefore, the primary act of humility avoids excess, and the secondary act avoids defect. On the other hand, the primary act of the virtue of fortitude avoids defect, because most men are by nature lacking in the bravery that fortitude displays in the face of imminent death. Yet for the intrepid few, fortitude has a secondary act which restrains any tendency toward audacity.

If the above examples are kept in mind, the fact stands out clearly that the primary act of recreation avoids excess of pleasure, or too much play. The secondary act avoids too little recreation; for while it is true that some men do not take enough recreation to insure mental and physical health, nevertheless these men are in the minority.

The foregoing discussion has established an object and a subject for this virtue, it now remains only to place it properly among the virtues. Because it is ordered to the good of the whole man, it will be contained under one of the four moral virtues. But, under which one precisely — prudence, justice, fortitude, or temperance? In order to determine this, the formal objects of the above four moral virtues must be examined to find the one that most closely coincides with that of recreation. This resemblance is found most properly in temperance, for temperance moderates pleasure derived from the matters of touch, while recreation moderates pleasure gained through diversion. In moderation of pleasure, then, the two are similar. But the formal object of recreation does not coincide perfectly with that of temperance. While it is true that both moderate pleasure, yet, as was stated above, the pleasures come from a different source. Since there exists this difference of formal objects, recreation is not an integral or subjective part of temperance. Yet, because they do correspond in moderation of pleasure, recreation resembles temperance enough to be called a potential part of that virtue.

The consideration of this virtue of recreation, by pointing out the necessity for the control by reason of even our humorous words, strikingly demonstrates the comprehensive scope of the moral virtues in human life. Moreover, the recognition of this virtue cuts deeply at the roots of the perverted puritanical philosophy which classifies laughter with sin, pleasure with vice, and which would forever dissociate recreation from virtuous living. Yet, to those who are constantly looking for escape from the restraint of living humanly, it demonstrates that the need for recreation does not provide a legitimate excuse for unrestrained pleasure.

Francis Kelly, O.P.
Kevin O'Rourke, O.P.

DOMINICANS IN THE ROMAN CURIA

WITH THE RECENT deaths of Father Mario Cordovani, Master of The Sacred Apostolic Palace, and Father Giovanni Lottini, Commissary of the Holy Office, the Church and the Order of Preachers have lost the services of two loyal champions of the faith who by their filial piety and doctrinal energy followed closely the example of St. Dominic in untiring, devoted service to the Holy See.

This loyal service to the Holy Father has been the cornerstone of all activity within the ranks of the Preachers from the time of St. Dominic. In *The Dialogue* of St. Catherine of Siena we read of St. Dominic: "Rightly he appeared as an apostle in the world, and sowed the seed of My Word with much truth and light, dissipating darkness and giving light." Even before the formal establishment of the Order of Preachers, the Holy Founder was actively engaged in fulfilling the needs and wishes of the Holy See. Conclusive evidence of this can be found in a brief examination of the history of the turbulent times that saw the rise of the Friars Preachers.

In 1206, Innocent III was faced with a most difficult problem. The twin-headed dragon of ignorance and heresy was strangling the life of the Church in its subtle coils. The evil fire this monster breathed caused the cords of faith to char and slacken. Without the sword of firm training in sound doctrine the clergy were powerless to turn back the foe; deprived of the shield of truth and holy example the faithful succumbed in great numbers to the spreading errors. This danger to the life of the Church was particularly severe in the south of France.

Realizing the perils of the hour, the Pope sought every means to restore and strengthen the position of the Church. He sensed that evangelical preaching — by word and by holy example — would be the surest way to strike the deathblow to the growing heresy. Men of saintly life and sound doctrines were sorely needed to dispel the pall of ignorance that had spread so rapidly over Christian Europe. Innocent did not hesitate. He restored evangelical preaching, introducing it into feudal Europe for the first time by ordering his legates in the south of France to promote this vital work with every means at their disposal.

The Holy Father had sent forth a call for a renewal of evangelical preaching. St. Dominic, already in France on a papal mission to subdue heresy, responded to Innocent's call by dedicating himself with redoubled energy to the work of this rewarding apostolate. The type of preaching Innocent had in mind corresponded to what Dominic had established and had been practicing in France for several years: imitation of the poverty of Christ, simplicity of dress, zeal to instruct all men by the example of one's holy life, and preaching the word.

St. Dominic's labors in the service of the Holy Father were indeed successful. By 1215 peace had returned to southern France; the dragon of heresy had been driven from the land. The results of the holy preacher's zealous apostolic labors in France were also felt in Rome. The evident success of his work provided the Fourth Lateran Council with a basis for important legislation dealing with preaching the Gospel to the faithful and systematic instruction of the clergy in sound doctrine.

When St. Dominic appeared in Rome in 1216 seeking official approval for an order of preaching friars, Innocent's successor, Honorius III, was greatly impressed by the saint's ability to win souls, to win them with and through the Church. The Pope was inspired by the rare courage and fortitude of St. Dominic. Here was a man who had struggled alone against heresy in Languedoc for twelve years without any sign of weakness. Here was a man most eager to continue the important work of providing the Church with teachers and preachers.

In confirming the Order of Preachers, Honorius III followed a plan conceived by Pope Innocent, a plan that was constantly furthered by St. Dominic. Addressing Dominic in the Bull *Nos Attendentes,* Honorius wrote: "Considering that the brethren of your Order are to be champions of the faith and true lights of the world, We confirm your order and take it under Our government." By this act the Order of Preachers became permanently bound to the service of the Vicar of Christ.

With official approval from the Supreme Pontiff, the growth of the Order was rapid. Its apostolate was intense and the work of the Friars embraced many forms of activity. Study, preaching and teaching were their major pursuits. But the popes soon called upon the Preachers to extend the scope of an already heavy program. They made constant demands on the Order for the services of its members in the interests of the Church. During one century over four hundred and fifty Dominicans were appointed bishops, among whom were included fourteen cardinals and two popes, Innocent V and Benedict XI. In addition to these nominations to the episcopacy, the Preachers were named as vicars, inquisitors, legates, nuncios, administrators, counselors, and ambassadors. Many were appointed as spiritual directors of religious communities and as moderators of lay associations.

Referring to the splendid work of the Friars Preachers, Innocent IV in 1248 called the Order the public horse of Christendom:

> The Order of Preachers . . . is like a public horse, ever ready to struggle against the malice of heresy, to correct the mistakes of the faithful, to temper the malice of tyrants, to bear the burdens of the universal Church, and, above all, to come to the aid of prelates.

The Papal Court itself called upon the Preachers to provide for its many needs. Dominicans became vicars of Rome, lectors of the Curia, penitentiaries and papal chaplains. But, as Père Mandonnet has said:

"with the institution of the Masters of the Sacred Palace . . . a new category of persons was placed directly at the disposal of the head of the Church." The institution of this office was a further step in providing outstanding members of the Order of Preachers to devote their energies constantly to the needs of the Holy Father.

Master of the Sacred Palace

Since the Masters of the Sacred Palace are always at the service of the Holy Father, the duties, rights and privileges of this office have varied considerably in seven hundred years, depending always upon the immediate requirements of each occupant of the Holy See.

St. Dominic's duties as Master of the Sacred Palace consisted mostly in advising the Pope on theological matters and also in expounding the Epistles of St. Paul to prelates of the Papal court. The Apocalypse of St. John was also included as subject matter for these lectures and sermons. These biblical lectures were the occasion of the establishment of a papal palace school. St. Dominic is considered its founder. After the Curia had established its own *Studium Palatii,* the Master of the Palace was Regent of the theology faculty. His chief duty was to lecture on Sacred Scripture and to preside over the theological school. The *lectores* or *magistri scholarum S. Palatii* taught under him.

At the cessation of the school, the Master of the Palace remained at the Curia in the capacity of theologian to the Pope. In the course of time the position involved other specific duties. Up to the 16th Century the Master preached before the Pope and the papal court in Advent and Lent. He also designated those who would preach in the papal chapel. Under Alexander V, the Master of the Sacred Palace delivered lectures on, and proposed answers to, questions raised at the theological conferences held in the presence of the Holy Father.

It was also the duty of the Master to examine sermons. In the time of Eugene IV, no one preached in the presence of the Holy Father without first having submitted the sermon to the Master of the Sacred Palace for approval. At various times it has been the duty of this prelate to examine all who were appointed to sees in Italy. At another time he alone conferred degrees of theology and philosophy in Rome. From the early 16th Century, down to and including Benedict XV's reign, he gave the *imprimatur* to all books printed in Rome.

Although the office has gradually lost some of its ancient authority and rank, nevertheless the Master of the Sacred Palace remains a very high official. His loss of authority stems from the general policy of the Church to place specialized work needed to carry out the functions of its government in the hands of permanently established congregations and commissions. The Master of the Sacred Palace is an official of several of these administrative organizations and commissions. By virtue of his office, the Master of the Palace is a Consultor to the Supreme Congregation of the Holy Office, Prelate Official of the Sacred Congregation of Rites, and Consultor to the Pontifical Biblical Commission. In addition to these duties, in recent times the Masters of the Sacred Palace frequently have been appointed theologians to the Secretary of State and Consultors to the Sacred Congregations of Seminaries and University Studies, Sacraments, and Religious. But the most important function of the Master of the Sacred Palace is that of confidential theologian to the Holy Father, in which capacity he is frequently consulted by the Sovereign Pontiff on matters of a grave nature.

There has been much controversy among historians over the precise origin of this ancient office. Altaner and Denifle attempt to refute the tradition that would make St. Dominic the first Master of the Sacred Palace. But in the *Hierarchia Ordinis Praedicatorum,* Father Taurisano places Dominic at the head of the official list of Masters of the Palace; and in the *Fontes Selecti* he disregards the arguments of these two historians, stating that the tradition regarding St. Dominic is quite valid, although anonymous. It is important to bear in mind here that the primary function of the Master of the Sacred Palace in early times was that of lecturer in Sacred Scripture to the Holy See. It is historically certain that St. Dominic was attached to the Papal Court in 1216-1218 and that he exercised these duties while in Rome at that time.

Among the other holy men who occupied the office of Master of the Sacred Palace, Father Taurisano lists St. Albert the Great, Blessed Bartholomew Bregantia, and Blessed Ambrose Sansedonio. Father Reginald Walsh stated that neither Albert nor Ambrose were Masters of the Palace. He claims that they held offices as Lectors of the Sacred Palace; i.e., that they were lecturers on Scripture or theology in the papal palace school. The two offices were not identical. The difference between master and lector was at that time similar to that between the regent or rector and other faculty members in present day schools and universities. The former headed the entire faculty; the latter were his subordinates.

St. Albert was Provincial of Germany in 1254. Two years later he journeyed to Rome to defend the Mendicant Orders against the slanderous attacks of William of St. Amour. According to Taurisano, Albert filled the office of Master of the Sacred Palace during his sojourn in the Eternal City. Concerning Blessed Ambrose, Father Taurisano states that Clement IV, wishing to reform the studium of theology after many disruptions occasioned by war, commanded the holy man to head the faculty and to lecture in theology. Ambrose fulfilled this office for three years.

These controversies are understandable when it is remembered that the duties of the Master of the Sacred Palace were not clearly defined at that time; nor were appointments to the office always explicit or specific. It was not until 1306 that the eminent Friar Preacher, Cardinal Nicola Albertini de Prato, obtained from Clement V the privilege that the office of Master of the Sacred Palace always be held by a member of his Order. This came about when Clement, having moved the Curia to Avignon at the behest of the French king, instituted a school of theology in his own palace. Peter Godin was the first Friar Preacher to be installed as Master of the Sacred Palace under this privilege.

During the unfortunate period of the Great Western Schism, the anti-pope Peter de Luna (Benedict XIII) appointed St. Vincent Ferrer as his Master of the Palace in Avignon. It should be noted that Vincent devoted a great deal of his time and his energies to effecting a reunion of the opposing factions.

Since the time of St. Dominic there have been eighty-nine Masters of the Sacred Palace. Of these, eighteen were cardinals, twenty-four were archbishops and bishops, and six became Generals of the Order. From the very nature of their duties the majority of the Masters have been renowned theologians. Among the most famous to have held this high position in the service of the Holy Father are: Cardinal Juan de Torquemada, the brilliant theologian and canonist; Father Sylvester Mazzolini de Prieras, the first champion of the Roman Pontiffs against Luther; Cardinal Orsi, whose outstanding gifts as a theologian and ecclesiastical historian were of such great help to Benedict XIV during the trying days of his pontificate; and Father Thomas Mamachi, the zealous supporter of the power of the Vicar of Christ at a time when most of the rulers of Europe were openly defying the Supreme Pontiff.

Father Cordovani as Master

Father Mario Cordovani's years as Master of the Sacred Palace were in keeping with the splendid tradition established by his saintly and learned predecessors.

Felix Cordovani was born in Casentino in the Diocese of Aretino in 1883. He entered the Order of Preachers at the Convent of Sancta Maria del Sasso in Bibbiena. He made profession there in June of 1901, taking Mario for his religious name. In August of the same year he was sent to the College of St. Thomas in Rome to begin his initial studies in philosophy and theology. From these very first years Brother Mario applied himself with great diligence to the scholastic activity in which he was to excel for the rest of his life.

Father Cordovani was ordained to the holy priesthood in Rome in June of 1906. He was twenty-three years old. Quite soon after his ordination he was awarded the degree of Lector in Sacred Theology, an unusual distinction for one so young. In November of that year Father Cordovani returned to the College of St. Thomas as a professor of philosophy and theology. Shortly after this he was also assigned to teach on the faculty of the Angelicum, the *Studium Generale* for the whole Order.

In 1921, after fifteen fruitful years of teaching in these institutions, Father Cordovani was appointed to the chair of Sacred Theology at the Catholic University of the Most Sacred Heart in Milan. He held this post for six years, to the advantage of the many students who were influenced by his great learning. He is especially remembered by those of his former students who today have been called upon to assist in the heavy responsibilities of governing the Church. To them he remains an inspiring example of devotion to the assiduous study of sacred science.

Returning to Rome in 1926, Father Cordovani succeded Father Sadoc Szabo as *Rector Magnificus* of the Angelicum, one of the highest educational positions in the entire Church. During this period he was extremely active in writing on various theological questions. He also devoted much time to the study of cultural problems. In addition to his unflagging intellectual activity, which included lecturing on dogmatic theology at the Angelicum, Father Cordovani was constantly engaged in the all-important work of bringing souls back to the Church.

In 1933, at the earnest request of the Italian Government, he was assigned to lecture on the philosophy of law at the University of Florence. He accepted this new work with great joy and eagerness, for it afford him an excellent opportunity to re-introduce into at least one secular institution the solid food of Thomistic Philosophy which, along with the teaching of sacred theology, had been prohibited in Italian universities for many years.

In 1936 shortly after the death of Father Sales, the brilliant theologian and biblical scholar, Father Cordovani was appointed Master of the Sacred Apostolic Palace by His Holiness, Pius XI. He held this office until his death in 1950.

Writing in memory of Father Cordovani, Father Emmanuel Suarez, Master General of the Order of Preachers, recalls the outstanding qualities of this illustrious yet simple religious. He was kind and openhearted, combining the great knowledge of a learned scholar with the consuming faith of a priestly religious. He was a priest and a Dominican in spirit and in all his activities, a versatile and clear-thinking genius, a profound theologian and philosopher untainted by the errors of his time. He was thoroughly familiar with the works of St. Thomas Aquinas, and he was an untiring promoter of the teachings of the Holy Doctor against the errors of the present day. He devoted himself to this task from his first days as a Friar Preacher.

In his last years, as Master of the Sacred Apostolic Palace, Father Cordovani crowned a life of intellectual and spiritual activity by devoting all of his energies to fulfilling the wishes of the Holy Father. He knew the extent of his duties; he placed his excellent gifts at the disposal of the Roman Curia. He dedicated his life to the faithful service of the Supreme Pontiff and Holy Mother Church. May he rest in peace.

The Roman Curia has also suffered a profound loss in the death of Father Giovanni Lottini, the recently deceased Commissary of the Supreme Congregation of the Holy Office. He, too, was a member of the Order of Preachers whose great piety and outstanding command of the sacred sciences resulted in his assignment to the Papal Court where he served the Sovereign Pontiffs for over forty-five years. Before speaking of his holy and fruitful years as a model religious and an esteemed official in the service of the Holy Father, it would be well to discuss briefly the history and present functions of the legislative body in which he served as commissary, the Supreme Congregation of the Holy Office.

History of the Holy Office

The roots of this congregation may be traced to the 1st Century when grave heresies were threatening the life of the infant Church. The first holy labors of the Apostles had been to spread abroad the truths of Christianity; but an additional and equally important burden soon followed, that of removing the faithful from the danger of deviation from the Faith through the influence of false doctrine. Today this is the duty of the Holy Office.

Regarding the obstinate sinner, Christ said: "let him be to thee as the heathen and the publican."[1] St. Peter followed faithfully the teaching of the Master in this matter by pointing out the unfortunate condition of those who remain obstinate in heresy, calling them "rash and self-willed."[2] "They entice unstable souls; they have their hearts exercised in covetousness; they are children of a curse."[3] So too, St. Paul, writing to the Galatians, gives firm and eloquent warnings to the perpetrators of doctrinal error. "If anyone preach a gospel to you other than that which you have received, let him be anathema!"[4] Anathema: cursed, excluded from the kingdom of God!

These fundamental views on heresy have been faithfully transmitted and acted on by the Church in subsequent ages. There has been no break in tradition from St. Peter to Pius XII. The dealings of the Church against heresy have always been animated by a sprit of extreme severity. The sentence on the obstinate invariably has been excommunication; under purely ecclesiastical discipline no temporal punishment could be inflicted on heretics.

Under the earliest Christian emperors down to the first half of the 17th Century, however, rigorous measures were enforced against the person and goods of heretics. They were considered guilty of crime against the State. Stern measures were taken in 382 against a variety of heresies, which included that of the Manicheans, when the Emperor Theodosius pronounced heresy a capital offence.

After the time of the Apostles, the Church's part in the work of counteracting the insidious effects of false doctrine then became the duty of pastors and bishops. But this responsibility was shortly assumed by the bishops assembled in councils when the spread of error by heretics became more unified.

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[1] Matt. 18:17

[2] 2 Pet. 2:10

[3] 2 Pet. 2:14

[4] Gal. 1:9

An important step in the development of measures to be taken against heresy was a decree of the Synod of Verona in 1184. Convened by Pope Lucius III, it imposed on bishops the duty to search out heretics in their dioceses and to hand them over to the secular power. Many historians feel that the first traces of centralization for the work against heretics are discernible in the canons of this council. But it remained for Pope Innocent III in the 13th Century to form a definite inquisitorial tribunal against heretics. From its earliest days it was called *Romana Inquisitio,* the Roman Inquisition. It was established in Rome in 1204 primarily against the Albigenses and other innovators in the south of France.

Innocent IV gave the Dominicans charge of this tribunal in 1251. Father Mandonnet remarks that no commission given to the Preachers by the Roman Church would be more delicate or more serious than that of judges in matters of heresy. Shortly after the middle of the 13th Century the Preachers shared this grave burden with the Friars Minor.

Owing to the progress of the Reformation, Pope Paul III, in 1542, declared this body to be the first tribunal of the whole world, establishing it as the "Supreme Universal Inquisition." Pope Sixtus V added this tribunal to the Roman Congregations. The number of cardinals assigned to it were increased, the general inquisitors looked to it for their instructions, and a cardinal prefect was selected to preside over the congregation. Cardinal Michele Ghislieri, afterwards St. Pius V, was the first to hold this important office. The popes have long reserved this prefecture to themselves.

The Constitution *Sapienti Consilio,* issued by Pius X in 1908 to effect a detailed reorganization of the Roman Curia, refers to this legislative body as *Congregatio S. Officii,* the Congregation of the Holy Office. The term Inquisition was discarded to protect the congregation from the hatred inspired by that name. It still retains the title of Holy Office, so in keeping with the most holy office which it fulfills.

The Holy Office has competence in all questions regarding faith and morals, the Pauline privilege and mixed marriage: it also acts as censor of publications against the Faith. The Congregation has jurisdiction over crimes against the Faith and the unity of the Church, such as: apostasy, heresy, schism, profanation of the Eucharist, and so on. It also judges all questions pertaining to the dogmatic doctrine of indulgences, new prayers and devotions. The proceedings of the Holy Office are treated with the most rigorous secrecy.

The Commissary of the Holy Office is an official of the Congregation. He ranks below the Cardinals and the Assessor. Father Taurisano says that the office was established by Paul III. The Commissary was properly so called because the College of Cardinals committed to him the duty to receive accusations, order the imprisonment of heretics, and to take the responsibility for the legal processes against these heretics. The Commissary also rendered judicial aid in important matters, was a judge in ordinary, and took charge of the temporal goods of the Congregation. At one time the Commissary had precedence over the Assessor of the Holy Office; but this was changed in the 17th Century.

The office has always been held by a Dominican. The Vice-commissary and his two assistants are also Friars Preachers. Due to great confidence in his fellow Dominicans Pope St. Pius V reserved these positions to members of his Order.

Since 1542 there have been forty-four Commissaries of the Holy Office. Of this number sixteen were elevated to the episcopacy, seven were made cardinals, four became Master General of the Order of Preachers, and one, St. Pius V, was elected Pope. All but five have been from the Dominican Province of Lombardy.

St. Pius V is the most famous of the Commissaries of the Holy Office. His heroic labors in defense of the Faith resulted in a strengthening of the Church at a time when attack came from many quarters. He realized fully the importance of resisting the spread of erroneous doctrine. His efforts as Commissary, then as Cardinal Prefect of the Congregation, and finally as Pope, were constantly bent to the task of furthering the influence of the vital work of the Holy Office.

Fr. Lottini and the Holy Office

Angelo Lottini was born July 22, 1860, in Jolo near Prato in Tuscany. Eager to join the Order of Preachers while still in his early teens, he was encouraged by his bishop to respond to God's call by proper preparation for fulfilling his vocation by study and prayer. With the help of his pastor, young Angelo applied himself so earnestly to these preliminary studies that at the age of fifteen he was able to enter the Dominican novitiate at Bibbiena, where he took the religious name of Brother Giovanni. After making religious profession the year following, he transferred to Florence for his philosophical studies. He completed his preparations for the sacred ministry in the Convent of St. Dominic at Fiesole, where he was ordained to the holy priesthood in 1883. The following year, at the age of twenty-three, he was awarded the Lectorate in Sacred Theology.

Father Lottini's first assignment was that of Master of the Apostolic School attached to the house of theology at Fiesole. He also assumed the responsibilities of lecturer in philosophy and physics in that institution. When not yet thirty years old he was appointed to the chair of theology and was made *Lector Primarius* at the house of theology. Father Lottini held these two important offices until 1898, in addition to which he lectured in philosophy at the diocesan seminary in Fiesole.

In 1898, Father Lottini was elected Vicar General of the Congregation (now a province) of St. Mark. He was a model of firmness and prudence, a splendid example of piety and charity. At this particular time he began publication of many philosophical and theological works.

His major works include: a three volume compendium of Thomistic Philosophy; an introduction to sacred theology in three volumes; another major work devoted to special dogmatic theology; an edition of the *Summa Theologiae* in brief form for the use of seminaries, with the arguments put forth in syllogistic form.

In recognition of his outstanding achievements in the sacred sciences, the *S. Universitas Theologica Florentina* conferred on Father Lottini the title of Doctor in 1901. Hearing of his outstanding qualities as a theologian and a philosopher, Archbishop Granello, O.P., Commissary of the Holy Office, proposed the talented Preacher as his First Socius in the Congregation. Blessed Pius X appointed Father Lottini to this post in the Curia in September of 1905, naming him at the same time a Consultor to the Holy Office.

Having attained to full and fruitful maturity in study, in teaching, and in the government of his fellow religious, Father Lottini soon won the esteem of the saintly Pontiff, who in 1906 conferred upon him the title of Master in Sacred Theology.

Father Lottini's work at the Congregation of the Holy Office was interrupted from time to time by appointments as apostolic visitator to a number of Italian dioceses. But he continued in the capacity of First Socius until 1911 at which time he was named Vice-Commissary of the Holy Office. When Father Dominic Pasquaglio died in 1919, Benedict XV appointed Father Lottini his successor as Commissary of the Holy Office, an office he was to exercise with splendid success for thirty-two years.

His Holiness Pius XII, writing to Father Lottini in 1943 on the occasion of the sixtieth anniversary of the holy Friar's ordination, indicates how greatly his labors were appreciated by the Sovereign Pontiff. The Holy Father manifested appreciation of the many fruitful years Father Lottini had labored for the glory of God in the fields of sacred science, regular discipline and service to the Holy See. His Holiness also expressed paternal recognition of the merits which his career had reaped for the Order of Preachers and for the Apostolic See to which he had consecrated his genius and his zealous efforts for so many years.

The last years of his life Father Lottini spent in the confinement of his simple monastic cell because of serious illness. Yet his brilliant mind was unhampered by this affliction. With gladness and thanksgiving he received the joyous and triumphant news of the proclamation of the dogma of the Assumption for which he had labored so tirelessly. Three months after this, on January 5, 1951, he passed to his reward.

Justin Murphy, O.P.

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